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Flood Control on Alluvial Rivers—I

By Fred H. Tibbetts

Chief Engineer, Sacramento River West Side Levee District

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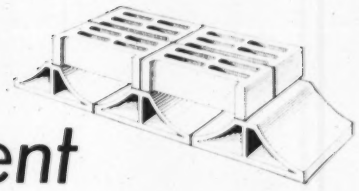

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ENGINEERING NEWS-RECORD

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F. E. Schmitt, Editor

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Not Good Sense

READING the September issue of *The Constructor*, official organ of the Associated General Contractors, we note that a record for moving dirt was made on a railroad job near St. Louis. No less than 118,000 cu.yd. was moved in 28 days. One fact given to explain this performance is that *"the contractors worked single shifts of fifteen hours per day."* This is startling news if true. When so many men are looking for a chance to get any work at all it seems incredible that some men should be overworked to this exceptional degree. What a wonderful opportunity a case of this kind gives some legislator to take up the cudgels in defense of labor! Contractors can expect no relief from the deluge of wage and labor regulations pouring out of law-making chambers everywhere if they fail to use sense in handling labor. The spectacle of a crew working fifteen hours a day while surrounded by hundreds of hungry unemployed is one not likely to be ignored by labor leaders or legislators.

Wage-Law Muddles Getting Worse

THE status of the Illinois prevailing-wage act was further muddled last week by the decision of a circuit court declaring the law unconstitutional. All hopes of much work being done this season on a huge highway program have gone glimmering. The state's attorney general, ignoring the decision, advises the highway department to consider the law constitutional until the state supreme court has had chance to consider it. But the contractors on work totaling nearly $5,000,000, awarded early in September, are faced with a dilemma. What would be their position in case the higher court confirmed the decision? They are naturally going to proceed slowly, making as little investment as possible and marking time until they are sure of their ground. Meanwhile the highway department is at a loss as to how to act on bids received Sept. 15 on $3,500,000 worth of work. Awarding further contracts now would be of little use in the face of the uncertainty confronting contractors. The Illinois wage act, intended to protect the workman, has not helped to relieve unemployment.

Up to the City

PROVIDING work by which the unemployed can earn a living next winter is now definitely up to the individual city. The President's statement of last Friday opposing national bond issues and "raids on the Treasury" made this finally clear. Many who have given serious thought to the coming winter's unemployment prospects have felt that real relief could be provided only by utilizing the nation's financing power to increase public work very greatly. They believe that, since the present emergency affects the whole people, it is a fitting matter for action by the national government, which represents the interests of the whole people. But the President has said that putting the unemployed to work is a local responsibility. It is a strange philosophy that deprives the people in their emergency of the help of their most powerful financing agent, the national government. But the conclusion must be faced as a fact, for Congress will meet too late to make any effective change in the situation. Accordingly, it is up to city and state to set intensively to work providing winter employment, in order that working squads may replace breadlines and tin-cup brigades. If any city has held back in preparation, hoping that the national government might assist, the time has come to start in dead earnest.

One Opportunity

NOT long ago the National Fire Protection Association in its *Quarterly* reviewed the fire record of state capitol buildings. After referring to the large number of destructive capitol fires, it says that in spite of apparent solidity many of these buildings "possess every defect possible from the standpoint of fire danger." Included in the list of defects are immense quantities of wood trim and equipment (even wooden ventilating ducts!), files and records, open stairwells and elevator shafts, concealed attic spaces and combustible basement storage. These conditions are commended to the attention of those who doubt that work enough can be found for the unemployed this winter. Aside from all other working possibilities there is a large amount of work to be done in cleaning up the dangerous condition of capitol buildings and safeguarding the centers of state administration. Any state that is at a loss to find enough jobs for its unemployed might investigate its own capitol —and perhaps also other state buildings—to discover some real opportunities. By the same token many cities can contribute to employment in like manner, we believe, for our acquaintance with city halls and municipal buildings indicates that not a few are in the same insecure condition as state capitols and have as much to gain through clean-up and modernization.

As to Business Policy

WILL the discontinuance of gold payments by Great Britain affect business and construction in the United States? This question, common in engineering

circles, permits of only tentative answer as yet. For, just as the closing of a large bank affects the whole community, so the partial cessation of payments by Great Britain, banker to the entire world, is bound to have many repercussions. Internationally, some loss of confidence and extensive rearrangement of international trade appear inevitable. As concerns the United States, however, the effects promise to be negligible. The real factors in the internal business situation can hardly be influenced. Supply and demand in this country are unchanged, our trading and financing powers are unimpaired, and relations between industry and labor should not be affected, since we are essentially self-contained. Business confidence, the great remaining factor, should if anything be strengthened by the knowledge that the United States is not involved in the international pulling and hauling that led to the sensational British step. The net fact, then, is that there is just as much reason and just as much need as existed a month ago for purposeful going-ahead in each individual plant and office. Energy, efficiency, forethought and determination are as decisive of success today as at any time since the 1929 collapse.

A Purpose Defeated

CLOSER to home than the British gold decision, and probably more serious in its effects here, is the simultaneous cutting of American labor wages by the large steel companies and a number of other concerns. It marks the breakdown of a solid national purpose to hold wage scales undisturbed. True, wage reductions have been going on sporadically for nearly two years, and the present action is only the continuation of a slow process of crumbling. Nevertheless it is momentous; a large block has now fallen, and the crumbling threatens to become a landslide. As the industries concerned were losing money they cannot easily be blamed for the cuts. But already it is predicted that price reductions will soon wipe out the advantage gained through the cuts. This is a bad outlook, especially if the future battles to bring wages back from their reduced level are thought of. Moreover, if steel, which comes as near as any industry to being free from the necessity of selling at a loss, nevertheless has to cut wages, it augurs ill for the ability of other industries to hold their scales. Because of the danger that they will bring about a general depression of wage rates, these simultaneous cuts constitute a strong argument in favor of the attempts made by labor to fix wage rates on public works. The attempts were both awkward and mischievous, and have proved largely ineffective. But they are likely to be strengthened and extended, as the only available defense against wage-cutting policies. And such extension, we believe, will implant in our national system a most evil principle.

A New Bird in the Skies

THE first flight of the navy's Zeppelin airship, the "Akron," has been successfully completed. Built in the huge Goodyear factory at the Akron airport, itself a structure of significance and importance to structural engineers, this new bird of the skies constitutes a vast laboratory for the study of man's ability to build structural framework to resist the elements. The structural design of the "Akron" departs from precedent in several important particulars. By using three keels or stiffening girders instead of one as in previous ships, it attempts to assure the longitudinal rigidity that the "Shenandoah" lacked when she broke in two in a storm several years ago. Ring girders of triangular cross-section represent another innovation directed toward rigidity and wind resistance, as does the relatively small slenderness ratio of 6 as compared with 7.2 for the "Los Angeles" and 7.7 for the "Graf Zeppelin." Duralumin is the material used. Both the design methods used and the performance characteristics of the framework during operations of the ship will be of interest to structural engineers generally. It can only be hoped that the navy department's sense of secrecy will not cause this information to be withheld. The wind stress studies planned for the Goodyear factory building at Akron and the model experiments being made for the navy's new dock at Sunnyvale, Calif., are also of direct concern to the engineering profession. It should be permitted to observe and discuss them fully.

Lest We Forget

THE report of the structural steel welding committee presented to the American Welding Society at Boston will, as we had occasion to point out two weeks ago, exert a profound effect on the future of the art. In this country and probably in many foreign lands the committee's investigation will serve as the foundation upon which the further advance of structural welding will be built. For such a contribution the engineering profession is indebted to each and every member of the committee, but in greatest measure to its first chairman, the late James H. Edwards, who organized the work, gave to it his highest enthusiasm and energy, and carried it almost to fruition before his untimely death. It is important that Mr. Edwards' name be linked inseparably with this investigation and with welding research in general. There is need for keeping the standards for which he stood constantly before us. Structural welding is still in its infancy. Its development depends upon men with pioneering spirit, organizing ability, sane judgment, balanced viewpoint, and above all practical idealism. James H. Edwards reflected these qualities throughout his life, coupling with them a courage of conviction that either confounded the opposition or rallied it to his beliefs. Similar qualities will be needed to develop welding to its greatest utility. His name and his memory deserve to be perpetuated in the field where he pioneered so effectively.

Separate Licenses for Engineers

THE fundamental soundness of separate licenses for each general class of engineers was affirmed in these pages three weeks ago in an editorial taking issue with views expressed by the board of direction of the American Society of Civil Engineers at its July meeting. Space then did not permit discussion of all of the considerations involved.

A single license for all engineers has as its chief advantage simplicity and absence of confusion as to the rights of the individual engineer. Its weakness lies in the fact that the qualifications for such a license must be set low and made of a very general character in order to permit each of the diverse kinds of engineers to qualify. Thus license qualifications broad enough to cover both the structural and the chemical engineer can be little more than a certification of the engineer's professional integrity rather than of his technical skill. A license issued under such a law says to the public, in

effect, "This man has demonstrated to the satisfaction of the license board that he will not design a bridge or a chemical plant that he is not qualified to design." In this form it is little more than negative protection to the public. Far better to say that certain men *are qualified;* such a law would give positive protection.

Objection is raised to separate licenses on the ground that they will result in confusion in the public mind as to the respective fields of activity of engineers, or will bring about a condition under which a number of specialists will have to be employed for any major undertaking. The extent to which either of these conditions develops will depend entirely upon the caliber and ethical standards of the engineers of the future. That confusion as to fields of activity can develop is evident from the sporadic outbursts of controversy between engineers and architects. But such controversies are fostered by men lacking in high ethical standards. Aside from the activities of these few troublemakers, there is no reason to expect confusion when, for example, the man who now practices mechanical engineering under a general license as a professional engineer finds himself classified as a professional engineer (mechanical).

Further, we see no reason to expect any very wide application of the principle of segregation in the immediate future. Except in the case of some branches of the civil engineering profession there is no urgent need for segregation of engineers into groups of specialists. Activities of mining engineers, for example, are now so hedged about by mining laws that segregation will not advance public safety. Operations of mechanical, electrical or chemical engineers generally are not sufficiently closely related to public safety to make their segregation a matter of immediate moment. Only among civil engineers are there definite reasons for giving thought to the need for separate licenses. In their field it is evident that the public is becoming more and more conscious of the responsibility placed in the hands of the men who build its more important buildings (the architect and the engineer), or dams and bridges, and in the hands of those who build and operate its water-purification plants and sewage-disposal systems. It rightly expects sanitary and structural engineers to be of assured competence.

The case of the sanitary engineer is the simpler of the two; there appears no valid reason why his segregation should not be undertaken now. In the case of the structural engineer, however, the integration of his field, in so far as it affects large buildings, with that of architects presents a special problem. To segregate engineers qualified in structural design, without also segregating architects of similar qualifications, would put those engineers at a disadvantage, and would only serve to perpetuate the public's present false sense of security in any plan prepared by any architect.

Architects' registration laws are blanket laws. The same license goes to the small-house builder, wholly ignorant of pneumatic foundation work or of structural steel frame design, and to the artist type of architect who abhors technical details, as goes to the man who can design a great skyscraper. Public safety will not be promoted by the perpetuation of this condition, nor will it be promoted by setting higher qualifications for engineers who may do building work than is set for architects. Segregation of men qualified in structural design is desirable, but it would be a grave mistake unless extended to all who do important building work, be they architects or engineers.

Professional self-interest urges the maintenance of blanket license laws. Public interest will be better served by special licenses for each major group of specialists. There are obstacles in the way of separate licenses, but they can be overcome. Segregation of the several classes of engineers into separate groups under one general license or registration law and the setting up of high and definite educational qualifications for each group is the goal toward which the profession should direct its activities.

Relief for Engineers

THE engineering profession cannot go to relief agencies with proposals for relief work which will provide work for its own members alone. Their proposals would quite properly be turned down as class demands. This is the objection to any proposal that calls for expanding governmental engineering works; most of the money appropriated for the work would go to but one class of people, to engineers. Relief work for unemployed engineers can come only through the engineering work involved in projects for the employment of as large as possible a part of the many classes of people now out of work. A great program of public works will provide employment for every kind of worker, engineers as well as others. It is the best form of emergency relief.

The idea that the preliminary planning for, and the supervision of, emergency work will provide work for engineers forms the nucleus of a plan for the relief of unemployment among engineers which is to come up for action at the October meeting of the American Society of Civil Engineers. This plan, proposed by the society's committee on salaries, already has been indorsed by the Metropolitan Section of the society and it is expected that it will get an early tryout in the New York metropolitan district.

Briefly, the plan calls for the employment of unemployed engineers in searching out public work that needs to be done and can be undertaken quickly; street repaving, park improvements, cleaning of stream channels, bridge widening, improvement of dangerous highway intersections, necessary building modernization, etc. This preliminary study is to be financed from a fund subscribed to by employed engineers. All possible work that is discovered by the search will be reported to the local unemployment relief agency for its guidance. In case the relief work is undertaken the engineers who have prepared the preliminary studies will, in so far as possible, be transferred to the relief agency to prepare more detailed plans and to do what engineering work is involved. A further detail of the relief program is that loans may be made from the engineers' relief fund to those engineers whose needs cannot be provided for through the relief work studies.

The plan has everything to commend it. It is concrete and practical in so far as any such plan can be practical. It puts local relief up to the local people and does not pass the buck to remote federal or state agencies. Obviously the plan will stand or fall depending upon the amount of support received in its early stages from engineers who are still fortunate enough to have jobs. It deserves that support. Many engineers are in difficulties now; others will be before the winter is over. Until some better relief plan develops this one should be made as effective as possible in helping them over their present difficulties.

Fig. 1—Bypass spillway on Sacramento River passing flood of March, 1928

Flood Control on Alluvial Rivers—I

Principles governing the planning of flood control—Methods of flood control—Bypasses—Storage or detention reservoirs, and channel improvements, with special reference to levees

By FRED H. TIBBETTS
Chief Engineer, Sacramento River West Side Levee District, San Francisco, Calif.

To Extend the Discussion by Brig. Gen. T. H. Jackson, Corps of Engineers, U.S.A., of flood control on alluvial rivers in *Engineering News-Record*, Jan. 8, 15 and 22, 1931, pp. 58, 105 and 145, and to reflect civilian engineering thinking on the subject, the editor requested F. H. Tibbetts, chief engineer, Sacramento River West Side Levee District, with long experience in flood-control engineering works, to prepare the articles which follow in this and the next issue. Gen. Jackson presented the principles of flood control in general summary, with particular reference to their application in the flood-control operations on the Mississippi River. Mr. Tibbetts' article follows a similar plan in which the flood-control works of the Sacramento River provide the representative example. These two series of articles, with contrasting opinion, present a summary of current thinking that commands attention.—Editor.

URBAN improvements and intensively cultivated farm lands have tended to concentrate upon the river banks as the country has become thickly settled. Therefore, upon the engineering profession in recent decades has fallen the important duty of constructing the works necessary to subject wandering and unruly rivers to the fixed position and orderly routine imposed by a complicated civilization.

For at least twenty years leading technical institutions of the country have given instruction in the principles and practice of flood-control engineering, and these principles are well developed in a number of excellent text books. There is also a wealth of authoritative technical information in published reports on flood control projects, outstanding among which are: the report of the Flood Commission of Pittsburgh, the report of the California Debris Commission, Capt. Thomas H. Jackson (66th Congress, First Session, House Document No. 81) and the splendid technical reports of the Miami Conservancy District. The principles of the control of floods by reservoirs are thoroughly worked out in Bulletin No. 14 of the State of California department of public works, entitled "The Control of Floods by Reservoirs."

When flood control is initiated in consequence of a disastrous flood, the destruction of bridges, growing crops, roads and buildings is obvious and easy to estimate. It is much more difficult but sometimes of greater importance to appraise the intangible and indirect losses caused by interruption to traffic, loss of employment, loss of business, depreciation of real estate values, increase of sickness and general lowering of community morale. To perform the task justly the engineer must have a broad, sympathetic understanding of the spirit and purposes, and of the business and economic organization, of the community where he is appraising flood damages, and must not concentrate too much on the purely technical and easily estimated direct damages. In cases where communities are expending large sums on flood control without waiting for a disastrous flood, the engineer must be a man of even broader vision and understanding before he can accurately appraise the maximum damage that a flood would inflict.

Flood Hazards and Frequency—The works of man tend to increase the frequency and heights of floods. This fact is frequently misunderstood and sometimes denied by engineers. Yet as cities develop they contract the channel with wharves, bridge piers and other structures; as a valley becomes settled, the lowlands are cultivated and the uplands deforested, and both activities tend to increase surface erosion and augment the load of silt carried by the rivers. Erosion may be still further increased by artificial disturbance of the land surface by operations incident to railroad, highway or canal construction, or by mining, particularly hydraulic mining. In the long run this work of man is of the greatest importance. It is probably primarily responsible for the tremendous damage in recent centuries from floods in China, and assuredly was directly responsible for the marked increase in flood stages, and even in low-water stages, of the Sacramento River and tributaries, within a period of less than 50 years after the valley was settled.

Flood Protection Benefits—There is a marked tendency to determine the economic justification of flood control by directly dividing the estimated damage from a flood of large magnitude by the estimated period of recurrence of such a flood. In its simplest form the procedure is thus: If a maximum flood causes a damage of $100 and if such a flood is probable once in 100 years, then the average annual damage from such a flood is $1, and it is then assumed that $1 per year is the maximum annual cost which can be justified for flood protection. This method of reasoning is fundamentally unsound. It neglects the indirect and intangible flood losses which may exceed the direct and apparent damage.

Preliminary Surveys—The first approach to any flood-control project must be with an open mind, to determine whether the problem can best be solved by reservoirs, levees, bypasses, channel clearing or deepening, reforestation or any other method not as yet used for similar purposes. The determination of general methods of flood control for most alluvial valleys should involve at least preliminary topographical surveys of all feasible reservoir and dam sites and of the river and its flood plain and flood basins. It may be argued that topographical surveys of the flood basin are unnecessary because the bypasses or flood channels will occupy but a small part of basin. The same could be said of topographical or general surveys for railroads, highways or canals. The parts of the flood basins that should be occupied by the bypasses cannot be efficiently determined without at least general topographic maps and general soil maps of the flood basins.

Cost Estimates—Cost estimates for levees, dams and bank protection should be made in the usual manner, keeping in mind the possibility of using a variety of available equipment and with a liberal policy permitting the use of alternative designs adapted to all kinds of equipment.

Right-of-way costs may be the most important item in the estimates, and frequently they are seriously underestimated. If large areas of land must be sacrificed for flood-control bypasses or reservoir sites, careful studies should be made of recent local trends in valuations and appraisals, particularly under eminent domain proceedings. A frequent source of important error in preliminary designs comes from the unnecessary location of structures in such a way that land must be sacrificed which ultimately proves to be much more valuable than the engineer first estimated.

Future Developments in Flood Control

Future developments in flood-control engineering, as forecast by recent developments and recent thought, may possibly take the following lines:

Reservoirs—Improved technique has made possible higher dams, larger reservoirs and more accurate advance flood prediction. The combined use of flood-control reservoirs for a variety of other purposes may effect great economies.

Bypasses—Flood control by bypasses is the most natural system and may be used only during great floods without complete sacrifice of the bypass lands. The economies of bypass location will be more carefully studied in order that the least valuable land may be occupied and the waterways have the most uniform hydraulic properties and lowest levees permissible. This will require more attention to topographic and soil surveys than has been given to them in the past.

Levees—Improvements in levee construction will result from the use of heavier and particularly more varied types of machinery. Levee specifications and designs doubtless will be more liberal to facilitate and encourage greater variation in contractors' methods and plant.

Bank Stabilization—As civilization in an alluvial valley advances, bank stabilization becomes increasingly important and expensive. Therefore, the direct loss from the destruction of improvements by bank caving will be given greater consideration.

Economics—The direct application of the economic theory heretofore widely used, that the maximum permissible annual cost of flood control is the damage from a flood divided by the annual average frequency of such a flood, will be rejected as unsound, as it neglects the vast intangible indirect damage from floods due to the interruption of the normal movements and organization of transportation and commerce over very wide areas, and furthermore gives no consideration to the value of insurance against any accidental loss or catastrophe.

Flood-Control Methods

Three general methods of flood control are recognized and will be discussed in turn: (1) bypasses; (2) storage or detention reservoirs; and (3) channel improvement, principally levees.

Bypass Control—The bypass or diversion method is fundamentally the most natural method of flood control for a large alluvial river. In a mature valley the river flowing upon a ridge formed of its silt deposits discharges into the flanking basins at high stages. The bypass method of flood control is intended to continue, under control, this most natural method of flood relief, diverting water at selected points during flood stages and passing it through leveed, partly leveed or unleveed parallel bypass channels back into the main river or a tributary or the sea.

Diversion Structures—As diversion structures for artificial bypasses concrete sills at normal river bank level tend to bury themselves with sand. The better practice is to have the level of water diversion adjustable by flashboards or otherwise (Fig. 1). Water should then be diverted through such structures in a sheet as low and flat and wide as possible, in order to divert the

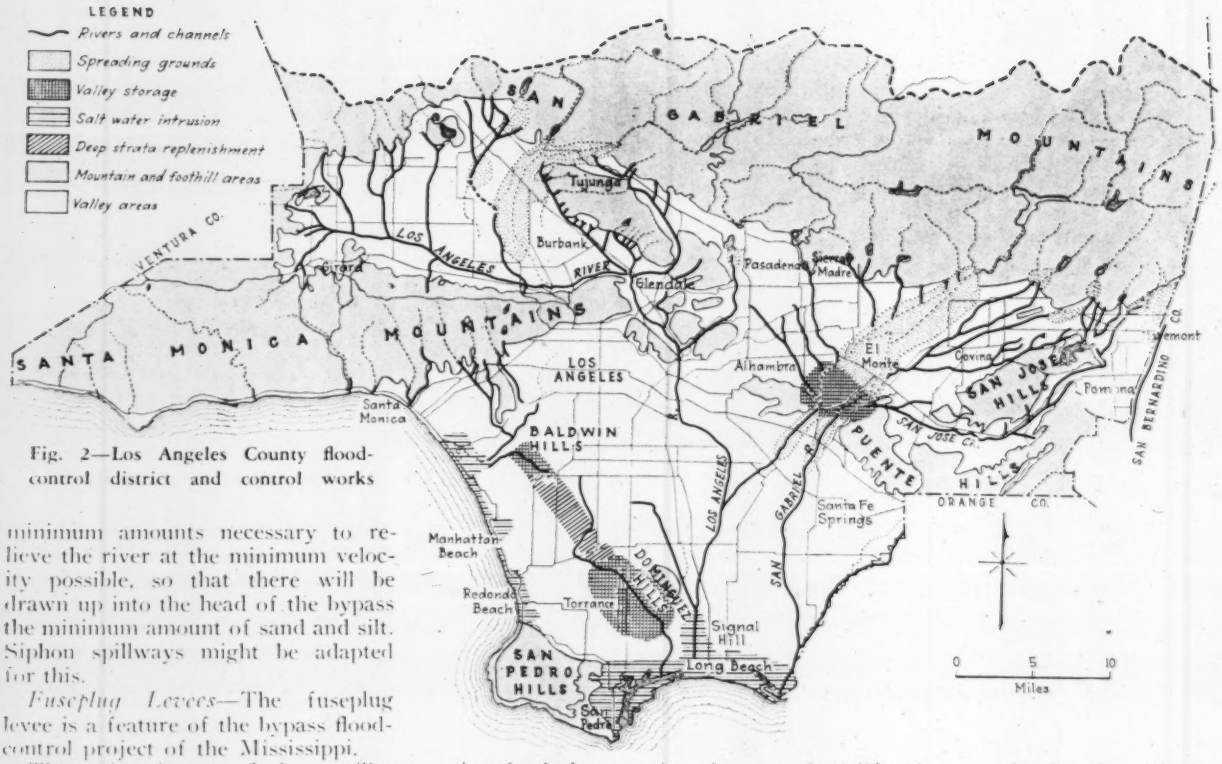


Fig. 2—Los Angeles County flood-control district and control works

minimum amounts necessary to relieve the river at the minimum velocity possible, so that there will be drawn up into the head of the bypass the minimum amount of sand and silt. Siphon spillways might be adapted for this.

Fuseplug Levees—The fuseplug levee is a feature of the bypass flood-control project of the Mississippi.

The writer is one of those still unconvinced of the wisdom of relying on the fuseplug type of levee. Efforts in an emergecy to remove quickly an old-established levee, even with the assistance of powder or dredging machinery, is apt to be very disappointing. It generally takes considerable time to get a long section of levee out of the way, even when the work is hastened in every possible manner. This is because of the resistance to erosion of the material involved and because of the rapid rise of the backwater as soon as any considerable amount of levee has failed. Vegetation or timber growth in the flooded back lands quickly piles up the backwater, reduces the head on a crevasse and checks its automatic extension.

Economics of Bypass Location—The economics of bypass location have not received sufficient consideration. It seems to have been assumed that the normal location of a floodway is in the lowest part of the flood basin. This is generally incorrect in principle. A bypass should be located like any other canal so as to follow as nearly as practicable a uniform grade—that is a grade contour—and keep levee heights and water depths, cross-sections, velocity and other hydraulic elements as nearly constant as the topography will permit.

Of great economic importance also is the location of a large bypass so that, as far as possible, it will occupy land that has the least present potential agricultural or other value, and to a lesser degree land that will be least subject to erosion or to channel deterioration from the growth of vegetation. These two requirements are apt to indicate the same location, as the poorer lands are less likely quickly to grow water-obstructing vegetation. To get even a preliminary location of a large bypass in conformity with economic principles, it is desirable to have at least preliminary topographic and soil surveys, the latter showing native vegetation.

The only major error in the great flood-control project in central California was the location of the bypasses in disregard of the land values sacrificed. This same error appears to be the cause of some of the present opposition to the locations first proposed for the Mississippi floodways.

The writer in 1911-12 located the Yolo Basin bypass, the principal feature of the central California flood-control project, by building the east levee thereof in complete disregard of the location originally proposed but after careful determination and study of means to sacrifice the least valuable land.

Bypass Clearing—Water channel to be efficient, must be cleared, and the clearing must be maintained. The cost of clearing is generally underestimated. To prevent new obstructing growths, the clearing must be thorough and be repeated at intervals, or the land must be placed under cultivation. A study should be made of the type of vegetation and the probability of rapid regrowth after initial clearing. This will enable intelligent estimates of the annual cost of maintaining a cleared bypass.

Careful study should also be made of the possibility of putting the bypass lands, when cleared, under cultivation or partial cultivation, such as close pasturage. This may afford a source of revenue, but should be studied particularly with a view of assuring a clean and efficient waterway. To facilitate cultivation, the drainage of the bypass lands should be well developed so that they may be put under tillage quickly, after use for floodwaters. It seems probable that great future improvements in long-distance weather prediction by which it may be possible to predict a dry season months in advance will still further facilitate the cultivation and maintenance of bypass lands.

Reservoir Control—The reduction of floodflows by reservoirs has become in recent years the most promising of all methods of flood control. Detention reservoirs now form the principal feature of the flood-control

project of the Miami Conservancy District, and storage reservoirs are almost the sole reliance of the Los Angeles County Flood Control District, protecting an urban area with a present value of about $3,000,000,000 (Fig. 2). Sole reliance for the city of Stockton, Calif., is placed on a detention reservoir, recently completed on the Calaveras River.

Combined Use of Storage Reservoirs—Important reservoirs in Germany have long been used for flood control, power production and navigation improvement, and in Spain for flood control and irrigation. To reduce floods, reservoir capacity must be available during the critical parts of the floods. If floods could be predicted long enough in advance to permit, just before their arrival, the emptying of sufficient reservoir space for their control, then reservoirs designed primarily for flood control could be used for power production, irrigation, navigation, domestic or industrial consumption.

Great advances are being made in the science of weather and flood prediction. Recent use of radio for weather reports from ships at sea and improvements in other methods of communication are facilitating the prediction of storms and floods considerably in advance of their occurrence. Floods in the lower regions of great river systems may be predicted many days in advance of their occurrence from observation in the upper regions. Floods on the Humboldt River in Nevada, for example, originate in mountain areas in Utah 700 miles, or one week's river flow, from the Oreana reservoir site. This reservoir can therefore be fully used for both flood protection and irrigation storage if outlets are provided that enable it to be emptied within a week when sufficient floods to refill it are known to be on their way. Efficient reservoir storage in the delta of the Nile was made possible only when Kitchener's machine guns opened up the headwaters to telegraphic communication. It should be possible to predict high flood stages on the lower Mississippi so far in advance of their occurrence that reservoirs, if feasible in the lower flood basins, could be extensively used for power production as well as flood control.

Where stored water is valuable for irrigation, power production or navigation improvement (reservoir releases for these purposes are most valuable outside of the flood season), great reservoirs become economically feasible, even though they would be much too costly for flood detention alone. This fact was well established in the classic contribution to engineering literature of Bulletin 14 of the State of California department of public works on "Control of Floods by Reservoirs."

The report of Col. T. M. Robbins, division engineer, Corps of Engineers, now in press (House Document 791, 73d Congress, Third Session) recommends the proposed $85,000,000 storage reservoir at Kennett on the upper Sacramento River, with a 420-ft. dam, ultimately to be raised to 520 ft., for the combined uses of navigation, flood control, irrigation storage and power production. Its use for flood control is entirely unaffected by its uses for the other purposes indicated and although uneconomical for any one or any two of the purposes for which it may be used, it becomes economical when used for all four purposes. This project even twenty years ago would have been considered an impossibility because of the required dam height of 520 ft.

The greatest reservoir yet proposed and probably the boldest engineering undertaking of all time is the Hoover Dam, which will control floods on the Colorado River, one of the most unruly streams of the country, without interfering with the use of the great reservoir for irrigation and domestic water supplies and without interfering with the power production, which will more than pay all of the costs of the project.

Detention Reservoirs—A detention reservoir is one constructed for flood control with fixed outlets always open. For the most efficient control, the outlets should be so designed that at all stages the reservoir releases can be kept constant and for complete control can be kept down to the maximum rate of discharge that the stream below can carry without damage. Such idealistic operation is academic until such time as the science of weather prediction enables accurate forecasting, some days in advance, of flood discharge into the reservoir.

Desilting—It is probable that on many alluvial rivers another great advantage of reservoir control as compared with the other methods of flood control is the desilting of the river at flood stages. This matter is emphasized in the final report of the engineering board of review on the Colorado River aqueduct location, Dec. 10, 1930.

Control by Channel Improvement—The control of alluvial river floods by levees, either on or near the river banks, is the most general method and in many cases the only method in use. In recent years great improvements in the design of levees and the use of heavier and more varied types of earth-moving machinery have widened the field for major levee control.

Hazards of High Levees—Earth levees should be designed and constructed on the same principles as earth dams. They are not high earth dams, but usually are very long and must be built upon a great variety of foundations, many of which would be deemed unsuitable and rejected for an earth storage dam. When they become of considerable height, and especially if the flood plane is raised a considerable height above adjacent inhabited property, levees become unduly hazardous, and the tendency has recently been on all major flood-control projects to reject the "levees only" method of flood control when the levees become dangerously high and to fall back on bypasses or reservoirs to limit increasing flood heights and levee heights. More attention in the future should be given to maintenance hazards, and particularly to methods of design or construction which will prevent weakening of levees from attacks of burrowing animals.

Economic Necessity of Bank Stabilization—When a river is leveed and bank overflow checked, the erosive power of the river is increased and bank attack becomes more rapid. If the lands adjacent to the levees are still unimproved, it is frequently the general practice as bank caving approaches a levee to "set back" the levee to a new and parallel location.

Bank caving at certain points will progress at a very uniform rate for many years, perhaps from 5 to 50 ft. per year, depending largely upon the runoff and particularly the floodflows. Under these conditions the life of setback levees can be fairly well predetermined and as long as the annual cost, including the purchase of land, is less for moving the levees back than for holding the bank, then and then only should the setback method be adopted. Under natural conditions, as caving banks are removed, the material is moved along to form mud banks lower down, and these are gradually built up to bank level so that there is no permanent loss in total land acreage, and hence bank erosion does not, in the long run, destroy great acreage.

This condition, however, will be but temporary and transient, one of the early stages of development of an

alluvial river valley. As soon as the valley becomes settled improvemnets tend to concentrate near the river banks, as there the land is higher, the soil better and the river transportation valuable and attractive. The best of the cultivated land, the highways, house improvements, villages and bridge abutments, concentrating on the river banks, make it vitally necessary to stop the river's wandering and check the bank erosion. To illustrate: If an orchard on the banks of the Sacramento River or an improved town lot on the banks of the Mississippi—in either case worth $1,000 per acre—is destroyed by bank erosion, it lessens but little the economic waste to demonstrate that the same area will in time arise as a mud bank somewhere else.

Channel Clearing and Dredging—Channel clearing within levee lines and channel improvement by dredging at contracted sections very frequently accompany levee methods of flood control. Clearing permanently increases the channel capacity, because it removes obstructions to channel flow, lessens the average "roughness" of the hydraulic prism and hence checks the deposition of silt and strengthens the river's power to keep the silt moving and thus to keep its channel open.

Reforestation — Wherever practicable, flood-control projects should encourage reforestation or any other method of checking surface erosion. Forests have some effect in all but extremes of river flow. Heavy forest covering tends to decrease minimum riverflows, but probably has little or no effect on the maximum floodflows. Reforestation, however, does have great advantages in checking erosion, hence in lessening the river's silt burdens. Reforestation or at least forest-fire prevention is considered a very vital matter in the Southern California flood-control situation. (See p. 15, Bulletin 32, division of water resources, State of California, department of public works, 1930.)

Channel Shortening — Channel shortening and straightening, usually by "cutoffs" at river bends, is a method of flood improvement that has always had such a popular appeal that engineers are frequently persuaded to indorse it even against their better judgment. Such measures are usually advocated without thorough appreciation of the fundamental physical laws that fix the location and length of a river channel in an alluvial valley. The bends in a river are not accidental; they result from the adjustment of the river's length to balance grade and velocity under normal flows, including floodflows, so that the erosive power of the river is in equilibrium with the erosive resistance of the material through which it flows. The importance of this matter can scarcely be overstressed.

Cutoffs always shorten the river channel, increase its velocity and power and accelerate bank attack. The sudden development of new bank attacks in formerly stable sections of the river is the greatest danger faced by most of our levee systems, and it is generally impossible accurately to foresee and to provide against such conditions in advance. Extensive cutoffs are permissible only with extensive provision for increased bank protection either to be installed in long sections prior to the cutoffs or to be available for immediate installation on a large scale as soon as the accelerated bank attacks develop. A number of important cutoffs were a feature of the 1911 plan of flood control on the Sacramento River. The writer, as chief engineer of the Sacramento River West Side Levee District, vainly opposed this feature of the plan. One of the important cutoffs was subsequently made and its effect has resulted in new bank attacks developing at a point where valuable warehouses and steamer landings made it necessary to hold the river bank. The remaining cutoffs have subsequently been abandoned.

Irrigation Proves Success Where Annual Rainfall Is 40 In.

SUPPLEMENTAL irrigation in the fertile Willamette Valley, in western Oregon, where the annual precipitation is about 40 in., has been proved economical by long-time tests and is entering the stage of actual development. The increasing economic necessity for greater agricultural production per unit of land, labor and capital, combined with a rainfall distribution that is exceedingly deficient during the May-August growing season, is bringing a change in a locality long considered to have an ideal climate for agriculture. The 4 in. of summer rainfall has a distribution which may include 60-day periods without rain; supplementing this supply by irrigation on test areas has resulted in average production increases; over a period of years, of such proportions as 61 bushels of potatoes per acre, 2½ tons of alfalfa, 4.8 bushels of dry beans, 2.8 tons of corn silage.

Experiments conducted by the Oregon Agricultural Experiment Station on field, truck garden and fruit crops have demonstrated that agricultural production in the Willamette Valley can profitably pay the cost of irrigation. This region has been under agricultural production three-quarters of a century and because of its 40 in. annual rainfall had until recently not been considered as needing any supplemental water supply.

The gross area of tillable land in the valley is estimated at about 4,000,000 acres. About 1,250,000 acres of this area lies on the valley floor and is topographically suitable for irrigation. By storage of winter runoff and utilization of underground supplies ample water may be made available for the irrigation of the whole area. Irrigation will be used to supplement the moisture stored in the soil from the heavy winter rainfall and that small amount available from the spring and fall rains. The duty of water will probably vary from 1 to 2 acre-ft. per acre on most soils and crops.

At present, development is almost entirely in small units supplying single farms or small groups. Wherever possible gravity systems are used, but in addition many small pumping plants are being installed to raise water from wells and surface supplies.

Supplemental irrigation during the summer months is proving successful in many lines. For example, several irrigation installations have been started by individual farmers for use on pasture land for dairy purposes; their success is indicated by the fact that each of these systems was expanded the second season. Again, an extended study by the experiment station has indicated conclusively that the production of small fruit crops under irrigation is profitable after allowing for every item of cost, including plant and operation. Finally, reports from the state engineer's office show that the acreage for which applications for water rights have been made has increased from 3,500 acres in 1928 to 57,000 acres in 1930.

The experimental and development work has been in charge of Dr. W. L. Powers, chief in soils; M. R. Lewis, irrigation and drainage engineer, and Arthur King, soil specialist, all of Oregon State College, Corvallis.

Remodeling a 34-Year-Old Sewage-Treatment Plant

Ithaca, N. Y., adopts sedimentation and separate sludge digestion after experience with plain dilution and septic tanks

By HARRY W. EUSTANCE
City Engineer, Ithaca, N. Y.

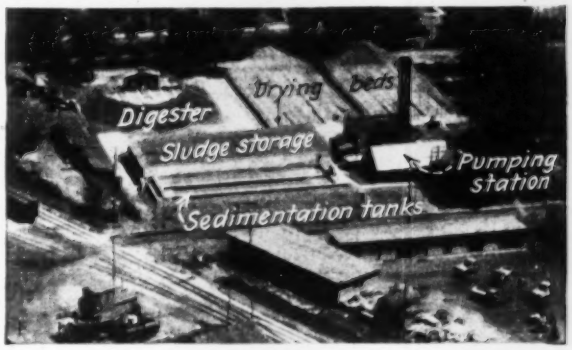
RECENTLY completed alterations and additions to the sewage-disposal facilities of Ithaca, N. Y., have provided that city with a virtually new plant. The works are located on the site and use many elements of previous works dating as far back as 1897, when the original scheme of dilution in Cayuga Lake was carried out according to the designs of Rudolf Hering and J. H. Fuertes. In 1909 septic tanks of the Cameron type were installed. The plant has lately been brought up to date by a number of changes in which much of the old equipment was utilized.

Ithaca is a city of 20,708 (1930) located at the head of Cayuga Lake, fed at this point by four main creeks with a combined watershed of 273 square miles. Shallow for the first mile from its head, the lake then deepens rapidly from 12 to 50 ft. in a distance of 200 ft. The original disposal scheme embodied simply a pumping plant and pipe line that discharged raw sewage into the deep water, on the principle that the solids settling out would lie dormant in the cold water of the lake bottom for an indefinite period and that the only limit to disposal by this method would be the filling up of the lake, a matter of incalculable years.

The pumping plant consisted of two displacement pumps of 1,500 g.p.m. or 2,160,000 gal. per day capacity each, which, with boilers and other appurtenances, were housed in a brick pump house built in 1896 on the bank of Cascadilla Creek, one of the main feeders of Cayuga Lake. The outlet to the lake consisted of 4,000 ft. of 14-in. cast-iron pipe and 7,000 ft. of 14-in. wood stave pipe. This equipment proved to be of insufficient capacity, principally because of excessive infiltration of groundwater into the collection system. As the flow increased, larger and larger quantities of untreated sewage were bypassed directly into Cascadilla Creek (which has a watershed of only 19 square miles) until such a nuisance was created that a better system of disposal had to be provided.

In 1905 an engineering study by Williams & Whitman, Inc., of New York City, considered three possible remedies: (1) continued disposal in the lake through a second pipe line; (2) sand filtration; (3) installation of septic tanks of the Cameron type. The last-named plan was adopted and in 1909 five Cameron tanks were constructed close to the pumping plant. These were 117x17 ft. in plan and 14 ft. deep, holding 12 ft. of sewage. Built as open tanks, they were no sooner placed in service than complaints from near-by residents led to their inclosure in a wooden shed. For several years the effluent from the tanks was disposed of in Cascadilla Creek without nuisance, but it later became advisable to build a new outfall leading to Cayuga Inlet, a larger stream with a watershed of 156 square miles. The new outlet consisted of a 20-in. tile pipe for 600 ft. to the bank of Cascadilla Creek, and 1,200 ft. of 22-in. wood stave pipe extending from this point to the inlet.

The steam pumps that had been used in the original lake disposal scheme were retained to lift the sewage from the incoming main to the septic tanks until 1918, when a shift was made to electric operation with the installation of two vertical shaft centrifugal pumps driven by electric motors. As the non-clogging type of impeller had not then been developed, these pumps required frequent cleaning. Furthermore, they were placed in a disadvantageous position. The original pumping station, built in 1894, included two oval pump pits, one of which housed the steam pumps while the other was unused.



Aerial view of Ithaca sewage-disposal plant

When the electric pumps were installed, they were placed in the second pit so that it would not be necessary to suspend operations during the setting-up period. Unfortunately the second pit was not so deep as the first, hence the pumps were well above the elevation of the receiving well and it was necessary to pool sewage in the latter to prevent the pumps from losing their suction. This backed up sewage in the main leading to the station, resulting in deposition and the loss of badly needed flow capacity.

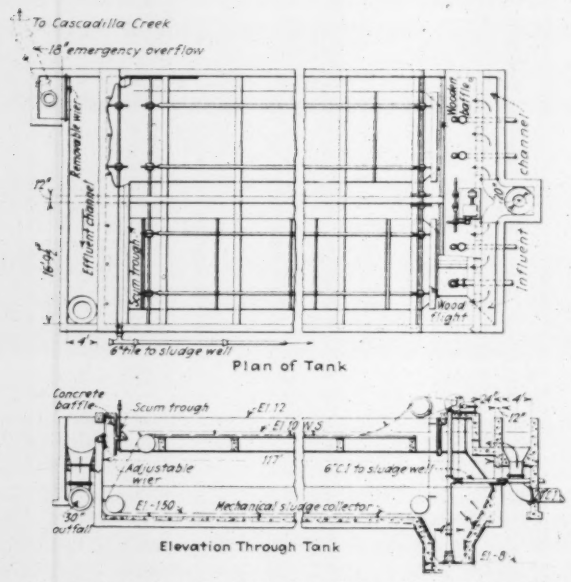
The effectiveness of the Cameron tanks in treatment was questionable, especially during the later years of use. Nothing but sand and mineral matter settled to the bottom, while sludge formed a scum on the surface to a depth of 4 or 5 ft. Although the effluent was not visibly unsatisfactory, as the quantity of flow increased the percentage of solids removed grew less and less. Furthermore, with the head available from the tanks, the outlet to Cayuga Inlet was too small to carry the wet-weather flow, especially when the level of that stream was high. At such times it was necessary to bypass the tanks completely and to pump the untreated sewage directly into the inlet.

These three major factors—insufficient treatment, inadequate outfall capacity and pumping difficulties—led to a decision, in 1927, to convert the plant to the plain sedimentation and separate sludge digestion type. This choice was based upon the fact that Cayuga Inlet, which receives the effluent, has a sufficiently large dry-weather flow to dilute properly a well-clarified discharge and also because the old septic tanks could readily be converted into mechanically cleaned settling tanks. Other changes authorized at this time included the construction of a new 30-in. cast-iron outfall pipe with a capacity of 7,000 g.p.m. and the installation of new pumping units in the deeper of the two pump pits. The old electric motors were retained.

Pumps—To balance approximately the dry-weather flow of 2,000 g.p.m. with a single unit, two 10-in. centrifugal units, each with a capacity of 2,200 g.p.m., were chosen for everyday duty. A third unit, held in reserve

for use with unusually large flows, consists of a 12-in. centrifugal pump capable of handling 3,600 g.p.m., giving a total installed capacity of 8,000 g.p.m., 11,520,000 gal. a day. Automatic float switches control all three units, making it impossible for the sewage to accumulate to dangerous heights. To remedy the condition that had caused silting in the approach main, a sump was built in the floor of the receiving chamber so that this main is completely emptied before the pump shuts off. In addition, the screen chamber was remodeled and a cross-bar screen with 1¼-in. openings was installed.

Sedimentation Tanks—Two of the five old septic tanks were remodeled into plain settling tanks, giving a 3¼-hour detention service with the present dry-weather flow. The



Old septic tanks remodeled for plain sedimentation and mechanical sludge collection

wet-weather flow, which frequently approaches 7,000 g.p.m. for short periods, must also pass through these tanks, and the influent and effluent channels were designed accordingly. Besides these channels, new construction on the tank included a hopper at the inlet end for sludge storage; a new reinforced-concrete floor; structural bracing by means of triangular fillets at the wall bases and transverse beams across the top, and the installation of mechanical sludge collectors. These details are shown in Fig. 2. As a precaution against flooding in case of a clogged outflow, an emergency overflow bypass was laid connecting directly with Cascadilla Creek. It is interesting to note that the concrete in the old septic tanks showed no deterioration after twenty years of contact with sewage. The three old tanks not used in the new system are held in reserve for sludge storage.

Outfall—The old outfall leaving the tanks was 20-in. tile and extended 600 ft. to a point on the bank of Cascadilla Creek; from this point a 22-in. wood pipe extended 1,200 ft. to the inlet. The short tile section was replaced with 30-in. cast-iron pipe which was joined to the original wood pipe at an overflow manhole. As the new combined outfall will carry 7,000 g.p.m. with the head available from the tank, at normal high stages of the inlet, this pipe will carry the effluent at all times except during periods of extremely heavy flow, when the excess over pipe capacity will be bypassed directly into Cascadilla Creek from the overflow manhole. At such time the flow of Cascadilla Creek will be sufficiently large to provide ample dilution.

Sludge Piping—To prevent clogging, all pipes carrying sludge are so arranged that they can be flushed, either directly by the sewage pump or through a temporary connection with city water pressure at 100 lb. per sq.in. To avoid any possibility of contamination connection with the city water supply is made through a 3-in. section of flexible hose which is broken except when flushing is actually under way.

Sludge Disposal—The work already outlined was completed in 1928 with the intention of disposing of the undigested sludge by drying on ash beds at the city dump. A short trial proved this method unsatisfactory, so plans were prepared for a sludge digestion tank and drying bed, which were built in 1930. Two sludge pumps—a 3-in. centrifugal with a capacity of 300 g.p.m. and a 4-in. piston pump that can be regulated through an eccentric to pump from 80 to 200 g.p.m.—transfer the sludge to a heated cylindrical tank 55 ft. in diameter and 19 ft. deep, equipped with a mechanical sludge scraper at the bottom and scum breaker above. Gases given off in the tank are collected and burned under a hot water boiler that is connected to heating coils in the tank walls. The digested sludge flows by gravity to six 20x120-ft. drying beds located in two glass inclosures near by. Drains under these beds connect with the sewer system, so that the drainage liquor again undergoes treatment. An industrial railroad is provided for removing the dried sludge from the beds. Based on a future population of 32,000, the digestion tank provides 1.4 cu.ft. of volume per capita, and the drying beds 0.4 sq.ft. of area per capita.

Costs—The work done in 1928 on pumping equipment, miscellaneous alterations, settling tanks and outfall cost $40,000. Additions in 1930, including the digestion tank and drying bed, cost $60,000. The pumping station building and the old outfall have been appraised at $40,000, making the total cost of Ithaca's disposal plant $140,000.

The 1928 additions and alterations were planned by H. W. Eustance, city engineer. The digestion tank and sludge-drying bed were designed by Glen G. Holmes, consulting sanitary engineer, Syracuse, N. Y., and his associate, Earl F. O'Brien. The plant was constructed by city forces under the direction of F. H. Feller, superintendent of public works.

Grain Elevator Has Tent Roof

A 5,000,000-bushel grain elevator of novel design, built on the line of the Chicago & Northwestern Ry. at Omaha, Neb., in 1930 and now being enlarged to double its capacity, consists of rows of circular concrete bins of varying height, having a row of tall bins at the middle with rows of decreasing heights on each side. The high central bins support the conveyor gallery, which is served by a tower at one end and has gravity spouts leading to the several bins. A flexible sloping "tent" roof is supported by catenary cables passing over the high central and lowest outside rows of bins and led to anchorages buried in the ground. Steel purlins attached to the cables carry corrugated iron roofing. This structure was built for the Cargill Elevator Co., Minneapolis, Minn., and the contractor for both the completed portion and the extension is the Fegles Construction Co., also of Minneapolis. Economy in cost and rapidity of construction are advantages claimed for the design.

High-Strength Concrete Used in New Fort Worth, Tex., Bridge

By C. MILO THELIN
Designing Engineer, Department of Engineering, Fort Worth, Tex.

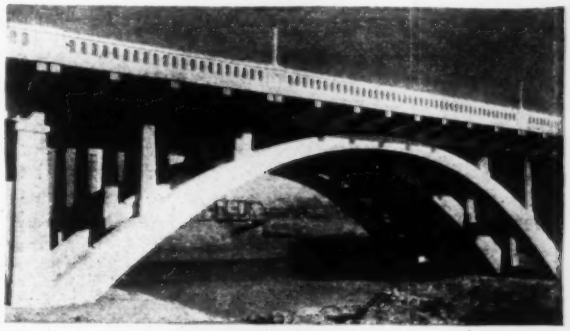
THE Royal Street Bridge recently completed by the city of Fort Worth, Tex., is an example of the comparatively recent trend toward the use of higher working stresses in the design of major highway bridges. All parts of the structure above the footings were designed for 3,500 lb. concrete using 1,050 lb. per sq.in. as the working stress for positive moment and 1,200 lb. per sq.in. for negative moment above supports. The footings were designed for 2,500-lb. concrete using 875 lb. per sq.in. working stress. Intermediate grade billet steel was used throughout with a working stress of 18,000 lb. per sq.in. The live loading used in the design consisted of 20-ton trucks with 80 per cent of the weight on the rear axle, or 150 lb. uniform live load per square foot. The sidewalks were designed for a uniform live load of 80 lb. per square foot. An impact stress of 25 per cent of the live load was used in designing all parts of the structure.

The bridge consists of fourteen concrete beam-and-girder spans of 48 ft. each and one open spandrel four-rib arch of 124-ft. span, giving a length of 796 ft. between abutments and 836 ft. total length. The clear width of roadway between curbs is 56 ft. providing four 9-ft. and two 10-ft. traffic lanes. A sidewalk 7-ft. in width is provided on each side of the roadway so that the total width is 70 ft. between handrails.

The entire structure with the exception of the arch abutments rests on concrete piles varying in length from 15 to 35 ft. which were driven to rock. The arch abutments are embedded a minimum of 3 ft. in solid rock about 30 ft. below the surface of the ground. A cofferdam 27×65 ft. composed of steel sheetpiling with timber bracing was used for each arch abutment. All footing concrete was poured in the dry.

The concrete used for footings utilized 5½ bags of cement per cubic yard of concrete in place, giving approximately a 1 : 2½ : 4 field mix and a minimum of 2,500 lb. per sq.in. when tested in cylinders. The concrete used for all parts of the structure above footings consisted of 7¾ bags of cement per cubic yard of concrete in place, giving aproximately a 1 : 1½ : 2½ field mix and a minimum of 3,500 lb. per sq.in. when tested in cylinders. All concrete was poured with a slump of from 4 to 5 in., to permit satisfactory placing in the heavily reinforced sections.

An interesting feature in the design of the arch span consists of a 7-ft. slab between the two interior ribs to carry two 20-in. water mains across the stream. Ex-



Slab cast between two interior ribs of Royal Street Bridge arch supports 20-in. water main

Royal Street Bridge in Fort Worth, Tex., presents a pleasing combination of arch and girder spans.

pansion joints are placed every two girder spans, or 96 ft., apart. Two bronze plates each ½ in. in thickness are used under each girder to allow expansion. Rock asphalt 2 in. in thickness is used for the wearing surface.

The contractor, Frank Parrott, Dallas, Tex., completed the structure exclusve of asphalt topping in nine months' elapsed time at a cost of $236,000. The asphalt was placed at a cost of $5,000. The structure was designed and the plans and specifications were prepared by the writer under the supervision of D. L. Lewis, city engineer, with Ira G. Hedrick, Hot Springs, Ark., as consultant. W. O. Jones, assistant engineer, had supervision of construction, with W. W. O'Farrell as resident engineer.

New Port Established on East Coast of India

Fig. 1—India and its new port

Swampy area developed for only harbor on 1,000 miles of coast—Dredging and filling form water and land areas —Quay walls of massive concrete monoliths sunk in place

WITH a 1,000-mile stretch having no port on the east coast of India between the ports of Calcutta and Madras, there has been for several years a demand for the establishment of an intermediate port with modern harbor facilities. Such a port is now under construction by the government of India and is to be completed in 1932. This will not only improve the country's accommodations for shipping but will give improved service to an interior district of some 125,000 square miles. It will also avoid the difficulties and delays incidental to handling cargoes to and from small coast towns by initiating the use of lighters and surf boats to serve coasting vessels lying in the open sea, where rough weather may prevent communication with the shore for several days.

This new port is at Vizagapatam, a city of 60,000 population, about 487 miles northeast of Madras and 547 miles southeast of Calcutta (Fig. 1). Until recently the city was served only by two railways following the coast line, but an essential feature of the port project is a railway extending 200 miles northward to connect with the railway system of the interior and thus give direct rail communication with the central provinces and the northern part of India. At Vizagapatam the long flat sandy coast is interrupted by a line of hills that extends to the shore line and forms a bay into which the Meghadri River discharges. This river is a small stream, sometimes dry, but behind the hills it flows through extensive tidal marshes that can be converted readily into a land-locked harbor by dredging and filling, as shown in Fig. 3.

A bar beyond the river mouth has excluded even small vessels, but as the tidal currents are practically normal to the short and there is little littoral current there is only slight shifting of the sand beach. With the new dredged channel it is considered that no breakwater or jetties will be necessary to protect the entrance, but observations will be made to determine whether dredging or the construction of jetties will be more economical in maintaining the channel. The tidal range is about 8½ ft.

Several early projects for a port at this place were based on inclosure of the bay by breakwaters and the establishment of harbor facilities along the shore, but further investigation showed the great economic advantages of the land-locked inland harbor. A general plan for such a development was recommended in 1914, but this included long entrance jetties. With the advent of the World War the project was shelved, but it was revived in 1920 and a large area of land was acquired. Propositions were made for the organization of a company to develop a harbor, But the government declined to relinquish the project to private enterprise, and in 1924 it decided to undertake the work with the assistance

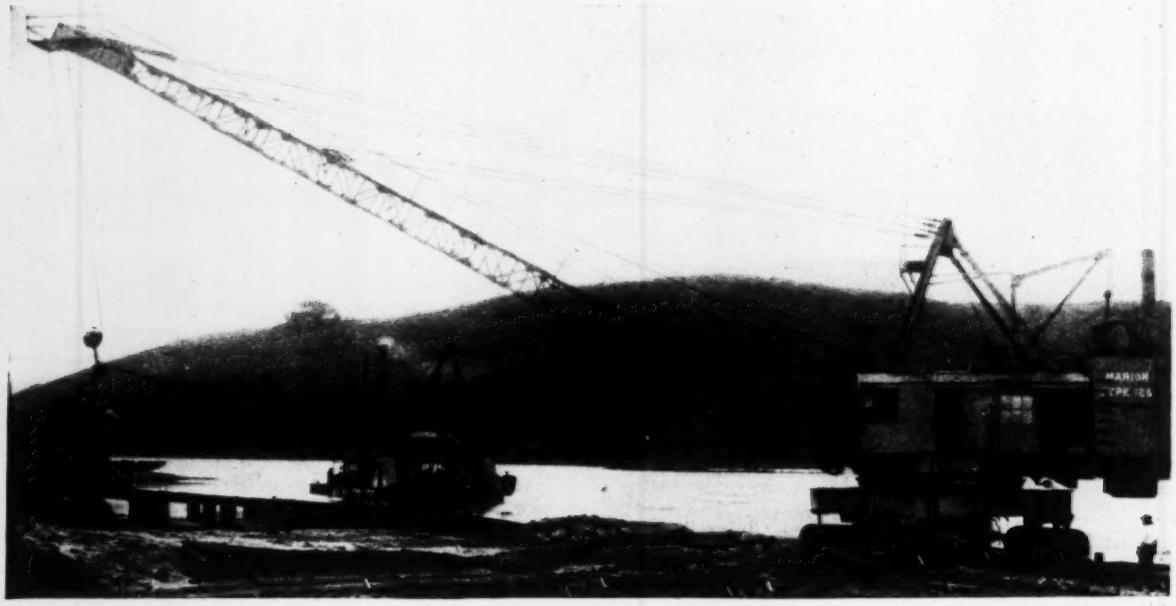


Fig. 2—Improving entrance channel
Dipper dredge removes broken rock. Dragline excavator is widening the channel.

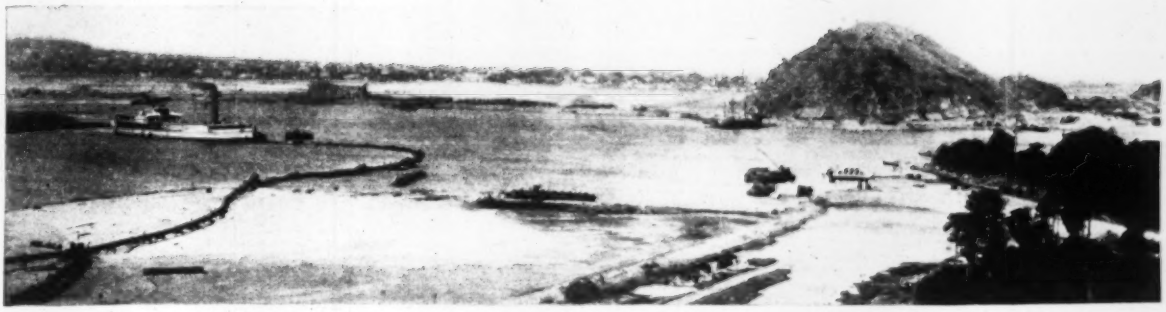


Fig. 3—Dredging harbor site at Vizagapatam

Suction dredge with pipe line filling site for oil-tank farm. Entrance channel at right. City in background on narrow strip of land between harbor and sea. Viewed looking west

of the Bengal-Nagpur Railway, the latter building the cargo sheds, railway tracks, yards and other facilities and also building the 200-mile railway to connect with its interior system at Raipur. The general plan is shown in Fig. 4 and a typical quay in Fig. 5.

Dredging the entrance channel, about 5,000 ft. long, gives 30 ft. of water at low tide for a minimum width of 300 ft. An area of about 40 acres has been dredged to the same depth, including the turning basin, oil dock and a portion of the north arm or basin. Most of the material is sand, which is handled mainly by a suction dredge capable of handling 1,000 cu.ft. of sand per hour. Other equipment includes a rock breaker, a dipper dredge for rock, a large dragline excavator and locomotive cranes handling grab buckets for sinking the monoliths forming the quay walls. Some of the machines are shown in Figs. 2 and 3. The dredged material is used for filling and reclaiming about 1,500 acres of land for port development, including quays, cargo sheds, store yards for ore and tank farms for an extensive oil business. About 160,000,000 cu.yd. of dredging will be required. While 30 ft. is the depth adopted for the main water area, there will be shallower basins and canals for lighters serving areas devoted to industrial purposes.

A quay about 2,000 ft. long is built of massive concrete monoliths, which were sunk in place by dredging through open shafts. This quay provides two berths for ships handling general cargo and one for those handling minerals (mainly manganese ore), which form an important part of the traffic. On account of this special business the storage area set aside for minerals has room for stock piles aggregating about 1,000,000 tons, with

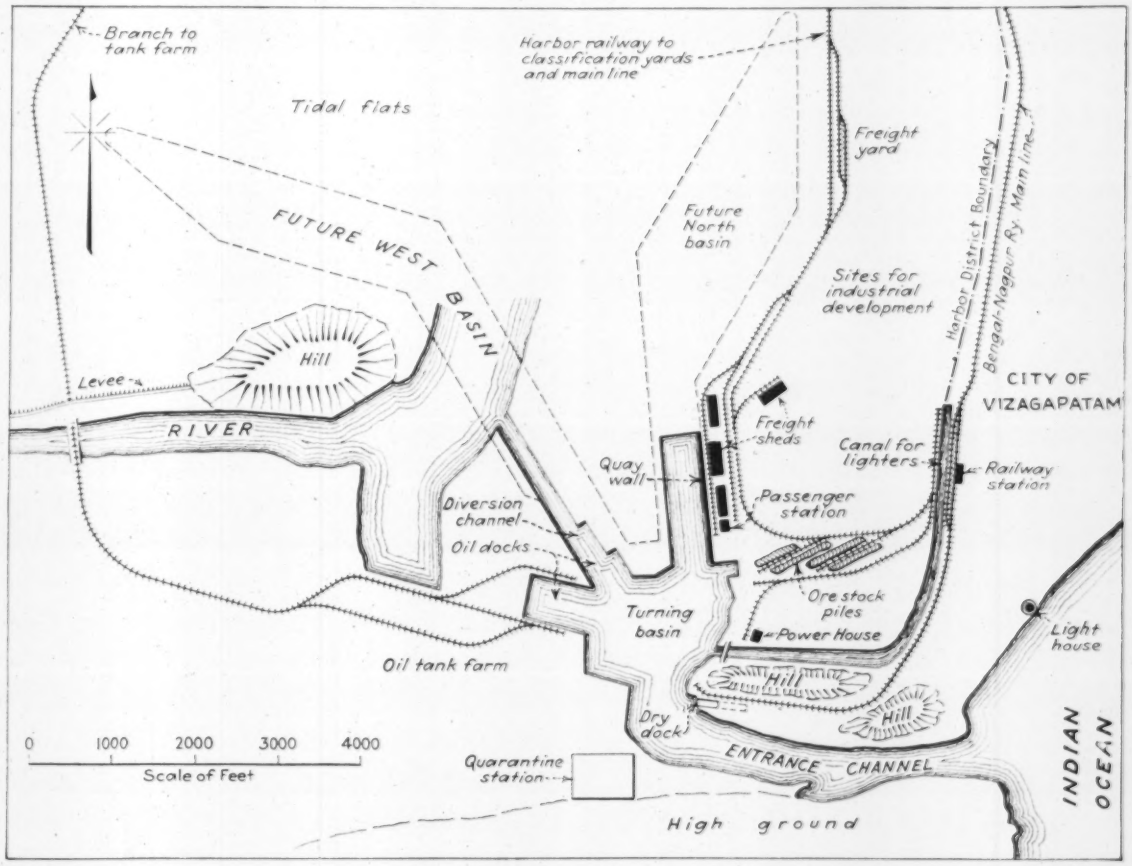


Fig. 4—Plan of port of Vizagapatam

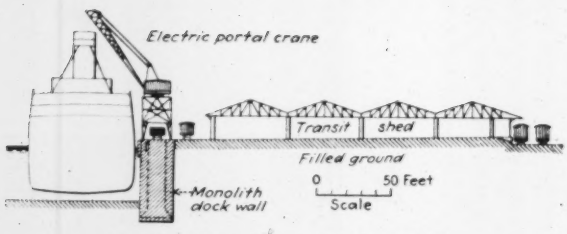


Fig. 5—Typical quay and cargo shed

ample railway trackage. On the cargo portion of the quay are one-story freight and transit sheds, each having 80,000 sq.ft. of floor area; there are also railway tracks, paved roadways and electric portal cranes of 1½ and 5 tons capacity along the waterfront. Tank steamers will be moored at a pontoon berth having pipe-line connections to the tank farm. Three mooring berths in the basin will provide for vessels loading and unloading by means of lighters. A dry dock provided for use of the dredges can be enlarged to serve merchant vessels, and space is assigned for general ship-repair works.

Studies are being made for a joint water supply for the port, railway and city, but at present the city has enlarged its facilities in order to serve the port. Joint sewage-disposal plans are under consideration, as well as plans for housing a labor colony. Owing to the prevalence of malaria in this district, special measures for sanitation and mosquito control have been carried out by the government's central malaria organization.

Harbor construction work is being done by both day labor and small contracts, under the direction of the railway board of the government of India. The general plan was prepared by H. Cartwright Reid, consulting engineer. W. C. Ash is chief engineer of harbor work, with O. B. Rattenbury in direct charge as acting chief engineer, representing both the government and the railway company. The new railway line is being built under the direction of R. D. T. Alexander, chief engineer of the Bengal-Nagpur Railway, and the general manager of the railway acts as administrative officer of the port.

Detroit Uses Temporary Pumping Plant in Summer Months

Water pumped from new reservoir during hours of high demand assures adequate pressure pending completion of new supply

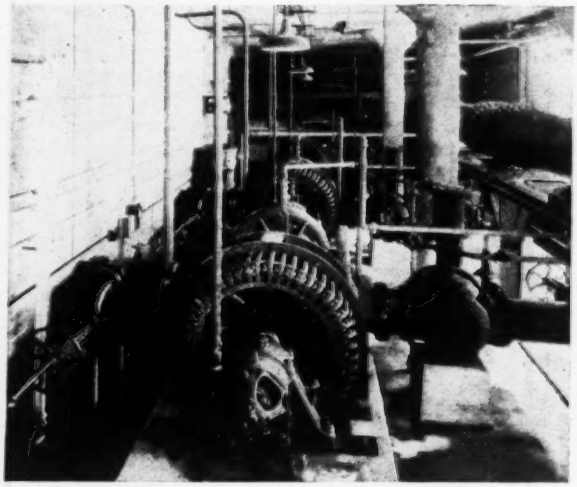
By WILLIAM C. RUDD
Assistant Engineer, Detroit Department of Water Supply

DURING the hot-weather period of 1930 the Detroit department of water supply operated a temporary pumping plant with a capacity of 51 million gallons daily, in conjunction with a new filtered-water reservoir, to assure adequate service to the western part of the city pending the completion of the new Springwells plant. The reservoir was filled from the distribution system during the hours of low demand, and the new pumps were operated from late afternoon until late in the evening.

The new water-works for Detroit, now under construction at the western edge of the city, will not be completed until late in 1931. On account of the probable shortage of supply during the summer months of 1930 and 1931 the temporary pumping plant was constructed and placed in operation in June, 1930. There are to be three underground reservoirs of 20-m.g. capacity each in the new Springwells project, one of which was finished last year. The temporary pumping plant is located at one corner of this reservoir, occupying a space which will later be used by the second reservoir. The design of the plant is such that the second reservoir can be constructed without interfering with operation. The pumping equipment was selected so as to be capable of being transferred to the permanent pumping plant in the future.

There is a balanced regulating valve in the plant to adjust the flow into the reservoir to suit the pressure requirements. Three centrifugal pumping units are provided, each having a capacity of 17 m.g.d. against a head of 180 ft. They are driven by synchronous motors operating on central-station power at 4,600 volts. The switching equipment is of the remote-control type. The discharge line of each pump is equipped with an automatic check valve.

The plant was designed and constructed for the board of water commissioners of the city of Detroit under the general direction of George H. Fenkell, general manager and chief engineer, who was assisted by Frank H. Stephenson, engineer of water system and assistant chief engineer. The design was under the writer's direction, with assistance of Frank E. Simpson, associate structural engineer on structural design; Bernard J. Mullen, assistant mechanical engineer on hydraulic and mechanical design; and Carl J. Schoeninger, chief electrical inspector on electrical design.



Detroit's temporary plant maintains water pressure in western districts

Three motor-driven centrifugal pumps have combined capacity of 51 m.g.d. They will be transferred to the new permanent Springwells plant when that is completed.

Albany Abandons Hudson River for Upland Water Supply

Increasing pollution and inadequacy of old filtration and pumping equipment lead to change—New gravity system maintains ample pressure in all parts of city—First part of three-stage development recently put in service

SINCE 1876 the city of Albany, capital of New York, has taken its water supply from the Hudson River at a point immediately above the city, but below Troy and the Mohawk River. Pollution from these sources led to the construction, in 1898, of a slow-sand filter plant, one of the first in this country. It was built under the direction of Allen Hazen. In 1908 this plant was supplemented by scrubbing filters; later it was changed to the rapid-sand type. In 1913 the city experienced a serious typhoid epidemic following the flooding of the filter plant. The difficulty of continued successful filtration under an increasing load of pollution, the ever-present possibility of interrupted service from floods, unsatisfactory pressure conditions in the higher and more rapidly growing sections of the city and a demand approaching filter and pump capacity brought about a situation, in 1925, that demanded either the construction of a new filter plant at another location on the Hudson River or the adoption of an entirely different source of supply.

Relative cost estimates showed a distinct advantage for the new supply, provided this could be secured without pumping. Under existing conditions further use of the Hudson River would have entailed extensive reconstruction of parts of the distribution system to maintain adequate pressure in the higher parts of the city; it would also call for continuous pumping of the entire supply, as before. There was no lack of other available sources, for a report submitted in 1926 by Nicholas S. Hill, consulting engineer, listed twelve of these with varying degrees of utility. By action of the state legislature the power to select and construct a new system was placed in the hands of a special board of water supply for the city of Albany, which engaged Robert E. Horton, consulting engineer, to prepare definite plans. His instructions were to favor, if possible, a supply originating within Albany County sufficient in quantity for at least 50 years, which would provide for gravity flow to all parts of the city of water pure enough to be used without filtration. Later the firm of Whitman, Requardt & Smith, of Baltimore, Md., was called in to assist in the design and to take charge of the construction work.

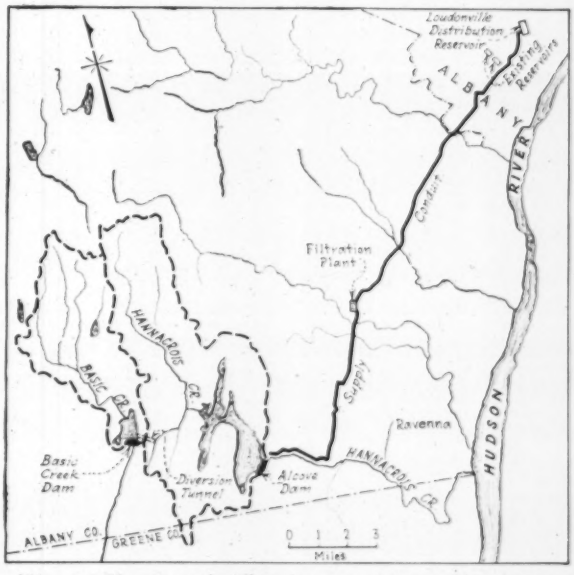


Fig. 1—Elements of Albany's new water-supply system

In 1926 the average consumption of the city was 20,000,000 gal. per day (20 m.g.d.), of which about 45 per cent was metered to the consumer. Upon the recommendation of Mr. Horton steps were initiated leading toward 100 per cent metering, a program which is still in progress, with the result that consumption at the present time remains at about the same figure. The 1930 census gives the population of Albany as 127,412.

Project Selected

All requisites for the new system were met in the Hannacrois-Basic-Catskill project, deriving its name from the three streams utilized. These watersheds lie partly in the southwestern part of Albany County, about 20 miles from the city, with all dams and other structures within the county line. Construction is planned in three stages, of which the first is practically completed. Fig. 1 shows the location of its elements, which include the Alcove storage dam on Hannacrois Creek, a diversion dam and basin on Basic Creek, a 2,800-ft. tunnel connecting the two watersheds, 20 miles of 48-in. cast-iron conduit from the Alcove reservoir to Albany and a 100-m.g. distribution reservoir at Loudonville, in the northeast section of the city. The watershed of Catskill Creek will be tapped in the second stage.

As originally planned, this project called for two main storage reservoirs on Hannacrois Creek, either of which could have supplied the city by gravity. The upper basin would have been used as a detention reservoir, while the lower would have acted, in effect, as a large clear-well supplying pure water to the conduit. Direct flow from the upper basin would have occurred only during emergencies. Inasmuch as the two reservoirs had a combined capacity equivalent to 400 days' consumption at 30 m.g.d. and the watershed area of both Hannacrois and Basic creeks is sparsely populated, it was felt that filtration, while perhaps advantageous during the first few years of use, was not necessary. This conclusion

was concurred in by such eminent engineers as H. K. Barrows, George W. Fuller and Ezra B. Whitman.

However, in New York all water-supply construction must be approved by the State Water Power and Control Commission, which has authority to require filtration if this should be deemed necessary. This requirement was imposed upon the Albany project, necessitating a number of important changes, including the abandonment of the proposed upper reservoir on Hannacrois Creek, increasing the height and storage capacity of the Alcove dam, increasing the size of the supply conduit from 45 to 48 in. and the construction of a 32-m.g.d. filtration plant.

The first stage of the development, now in service, has a dependable yield of 30 m.g.d plus an allowance of 2 m.g.d. for the village of Ravenna, which formerly obtained its water from Hannacrois Creek. The total watershed area is 48.9 square miles. When this supply becomes insufficient it is planned to construct the second stage, thus increasing the yield to 52.5 m.g.d. from a drainage area of 93.8 square miles, of which only 61.6 will be completely regulated. The additional amount will be obtained by adding Catskill Creek to the system, leading its waters into the Alcove reservoir through a diversion conduit. A storage reservoir will be built near the head of the stream and a diversion dam lower down at Preston Hollow. Stage 2 will also require construction of an additional pipe line, which will be sufficient in capacity to care for the yield from stage 3 as well.

Stage 3 will increase the supply to 69 m.g.d. by raising the Preston Hollow dam to provide storage for 1.95 billion gallons and by further diverting into the Alcove reservoir the waters of Ten Mile Creek, a tributary of Catskill Creek. The total developed area will then be 107.8 square miles, sufficient to supply the city until about the year 2000.

Construction of stage 1 has cost $9,000,000, or $300,000 per million gallons of dependable daily yield. Estimated costs, based upon 1926 prices, for stages 2 and 3 are $342,000 and $186,000 per m.g.d. The high figure for stage 2 is due to the inclusion of the second pipe line. These figures do not include filtration costs for stages 2 and 3.

Construction of Stage 1

Alcove Dam—The main impounding dam, across Hannacrois Creek at Alcove, N. Y., is a compacted earth embankment with a concrete corewall. It has a lenth of 2,177 ft. and a maximum height of 81 ft above streambed. Top width is 15 ft.; side slopes 1:3 and 1:2½ on the upstream and downstream sides, respectively, with a 20-ft. berm midway along the downstream slope. The reservoir side is protected by 18-in. stone paving for the upper 50 ft. and 36-in. stone riprap below this elevation. Adjoining the south end of the earth embankment is a 300-ft. concrete spillway at the head of a depression leading into Hannacrois Creek at a point 1,000 ft. below the dam. Due to the presence of rock close to the ground surface the required height for the concrete overflow section was only 18 ft. The spillway will discharge a maximum of 15,000 sec.-ft.

Alcove dam impounds 12 billion gallons of water, with a flowline elevation of 618 ft. and a minimum draft line 43 ft. below. Water is supplied from a direct tributary area of 32.55 square miles and also from Basic Creek through a 300-sec.-ft. diversion tunnel. Construction work on the dam was started in August, 1928, and completed in July, 1930.

Basic Creek Dam and Tunnel—The diversion dam on Basic Creek is of similar type, although of smaller size. Total length, including a 100-ft. spillway, is 872 ft.

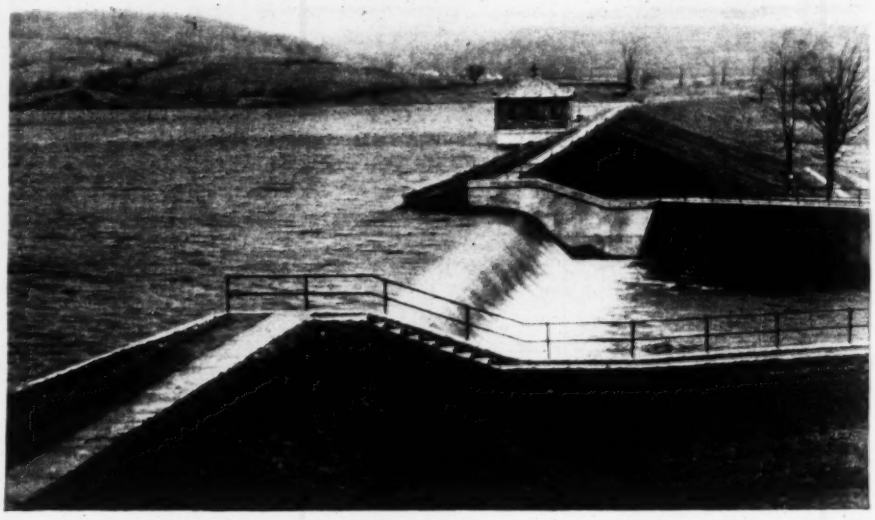


Fig. 2—Main storage reservoir at Alcove dam

maximum height 25 ft. Behind the dam is storage capacity for 670 m.g., but this reservoir will normally be empty. The diversion intake is placed low so that—as Basic Creek rises its entire flow goes through the tunnel until the 300-sec.-ft. capacity of the latter is reached; only then does storage behind the diversion dam begin. Later, as the floodflow drops, the tunnel transfers all stored water to the Alcove reservoir, leaving the diversion basin empty. Thus the storage capacity of the Alcove reservoir makes it possible to utilize a considerably larger part of the runoff of Basic Creek than could be obtained by permanent storage behind the diversion dam.

The connection between Basic and Hannacrois creek watersheds is 3,726 ft. long, consisting of 2,810 ft. of 5x6-ft. concrete-lined tunnel with concrete approach section at each end placed by the cut-and-cover method. The material was hardpan, requiring the use of explosives. All excavation was completed before any lining was placed, and the space behind the lining was grouted.

Pipe Line—Starting at Alcove dam, water is conducted to and through the city by 105,000 ft. of 48-in. cast-iron bell-and-spigot pipe terminating at the new Loudonville distribution reservoir. The 45-m.g.d. conduit enters the southwestern part of the city and is carried through to the distribution reservoir on the northeast, being tapped at intervals for distribution mains. This provision makes possible a two-way flow during periods of heavy consumption in the main part of the city, thus maintaining adequate pressure.

Widely varying physical conditions made it advisable

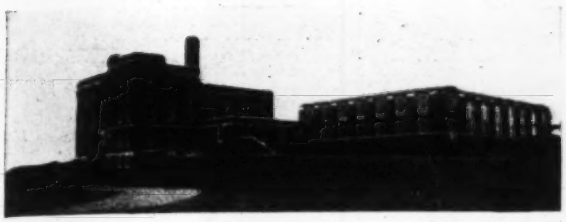


Fig. 3—The completed filter plant at South Bethlehem

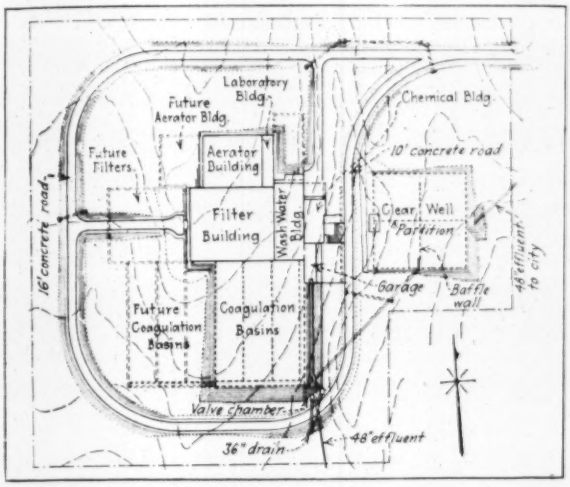


Fig. 4—Plan of new filter plant

Fig. 5—Constructing distribution reservoir at Loudonville

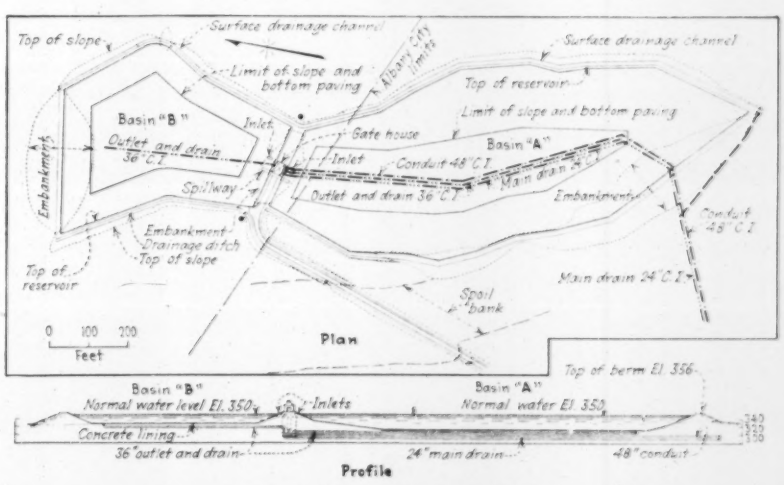
to divide the work into four sections. From Alcove dam to the filter plant (44,000 ft.) the line passes through rugged hilly country with a large proportion of the trench in fissured limestone rock. From the filter plant on to the Albany city line at the Normanskill (33,000 ft.) is wholly in earth. These two sections, however, were awarded to the same contractor. That part of the conduit within the city (25,000 ft.) naturally required different equipment and methods, so it was separated as a third section. The fourth included three special structures necessary to carry the conduit under two single-track railroads and the Selkirk yard of the New York Central. At these points concrete tunnels large enough for two pipes were installed, the inside dimensions being 15 ft. wide and 7½ ft. high. The tunnel under the eleven-track Selkirk yard was 1,100 ft. long.

Pipe for the entire line was purchased by the city under separate contracts and was delivered to the respective contractors on board cars at convenient delivery points. Further details regarding the pipe line are given in a subsequent article.

Filter Plant—The only suitable site for a filter plant was at South Bethlehem, at the edge of the Helderberg escarpment and about midway between Alcove dam and the city. Bedrock was close to the surface of the ground, resulting in considerable difficulty in excavation. Fig. 3 is an exterior view of the completed building, and Fig. 4 gives the general layout of the plant units. Raw water enters the plant from the south and passes through the chemical building to the aerator. After aeration it passes through mixing basins located in the basement of the washwater building, where it is treated with chemicals before entering the coagulation basins. After a 2½-hour detention period the water passes through eight rapid-sand filters, is chlorinated and passes to the 2-m.g. clearwell. Provision is made for lime treatment before the water enters the latter, which is designed as a sedimentation basin. The 48-in. conduit leads directly from the clearwell to the city. All flow throughout this circuit is by gravity. The plant has a capacity of 32 m.g.d. and will be operated at a uniform rate, the Loudenville reservoir being available to smooth out the daily peaks. Provision has been made in the design for doubling this capacity when necessary.

Distribution Reservoir—Three natural depressions in the hills in the northeast section of the city provide an excellent site for the Loudenville distribution and balancing reservoir, with flowline at El. 350. Two of these have been developed as concrete-lined basins holding 75 and 25 m.g., respectively, separated by a concrete-lined earth dike and a well containing control valves and piping. The third is available for future expansion. Fig. 6 is a general plan of the reservoir. Excavation was held to a minimum by closely following the existing ground contour. Cuts varied from 1 to 3 ft. in depth, with an average of 1½ ft., the excess material being used to fill in depressions in the rim of the basin.

As the underlying soil is a sandy loam and very permeable, the concrete lining required careful design and construction. The bottom of the reservoir consists of 20x20-ft. panels made up of two 4-in. slabs. Joints



Two concrete-lined basins form Loudonville reservoir

of the top layer were staggered with respect to the bottom layer and were filled with $\frac{3}{8}$-in. premolded bituminous material. Between the two slabs was a two-ply continuous membrane with an extra ply of fabric and an extra mop coat of asphalt under each top-course joint. Each layer of concrete was reinforced with 6x6-in. welded steel mesh weighing 85 lb. per 100 sq.ft.

Side slopes varied from 1 : $2\frac{1}{2}$ to 1 : 3 and were covered by a single 8-in. slab in place of two 4-in. layers. Panels were 16x40 ft. with 170 lb. of welded mesh per 100 sq.ft. At the joints a crimped copper strip 10 in. wide was filled with a premolded filler strip $\frac{1}{2}$ in. thick. Vertical displacement of adjacent slabs is prevented by $\frac{3}{4}$-in. dowels placed 18 in. on centers, in a manner similar to road-construction practice. Successful use of this type of construction on other reservoirs indicated that it would prove effective against leakage. It was realized, however, that the unusually unfavorable combination of an 8-in. thickness of dry concrete due to the steep slope and an unusually absorbent soil (almost capillary in action) might necessitate subsequent additional treatment of the joints or of the entire lining.

The reservoir was sufficiently completed on July 13, 1931, to permit filling, thus providing the first opportunity to test it for watertightness. The result was disappointing, for the amount of leakage through the joints on the side slopes was greater than could properly be allowed to continue. To remedy the condition a $1\frac{1}{2}$-in. layer of gunite is being applied over the entire reservoir surface.

COSTS AND CONTRACTORS ON PRINCIPAL UNITS, ALBANY WATER SUPPLY

Alcove dam	Winston & Co., Kingston, N. Y.	$800,000
Basic Creek dam	Henry Dumary & Co., Albany, N. Y.	160,000
Basic Creek tunnel	S.T.Groves & Sons Co.,Minneapolis,Minn.	248,000
Pipe laying, Alcove to city	Pepper Bros., Syracuse, N. Y.	765,000
Pipe laying, within city	A. Phelps & Sons, Detroit, Mich.	395,000
Pipe for conduit	U.S.Pipe & Foundry Co.,Burlington,N.J.	1,942,000
Loudenville reservoir	M. F. Dollard, Jr., Albany, N. Y.	632,000
Gunite lining	Cement Gun Co., Allentown, Pa.	110,000
Filter plant complete	Various	1,060,000

All concrete for the reservoir construction was mixed at a central plant 1 mile distant and hauled to the job by trucks. These dumped directly into the forms for the bottom slabs. For the sides the mix was delivered at the rim of each basin and chuted into place through wooden troughs placed directly on the ground.

Costs—Total costs of the principal units in the new water supply are given in the table, which also gives the names of the contractors responsible for the divisions listed. In addition, there were a number of other contracts covering minor features that it is not necessary to list. As already noted, the work was prosecuted by the board of water supply for the city of Albany, of which Neile F. Towner is chairman. The firm of Whitman, Requardt & Smith, Baltimore, Md., was the engineer, with Robert E. Horton, of Albany, as consultant.

* * * *

High Efficiency Attained on Albany Pipe Construction

Machine excavation used entirely on 20-mile cast-iron line—75 per cent of working time devoted to digging and laying—Joint tests show remarkably low leakage factor

INSTALLATION of the 48-in. cast-iron pipe extending from the Alcove reservoir of the new Albany, N. Y., water-supply system to the city line was an outstanding example of the effective application of machine methods to a large-scale construction job. Although a considerable part of the conduit was laid in rough and rocky country, every foot of the trench was excavated by machine, and only 25 per cent of the actual working time was used for other than productive operations.

Territory traversed by the line includes 12,600 ft. of boulder-filled valley, including seven stream crossings; 31,400 ft. of rough hilly country, where the trench passes largely through fissured limestone with a thin covering of earth; and 33,000 ft. of fine silty soil resembling loess. The latter extends to a depth of from 6 to 8 ft. and is underlain by a fat blue clay. Average pipe invert depth is 8 ft. below the surface. Normal groundwater level is above the impervious clay, so that a large amount of wet excavation was anticipated. This expectation, however, was not realized due to the fortunate fact that the work was carried on during two unusually dry seasons.

The right-of-way provided by the city was, in general, 66 ft. wide. The trench was located 20 ft. from one edge, leaving a 46-ft. strip free for the storage of materials. Pipe was transferred directly from railway cars to track-and-trailer units by a locomotive crane and was distributed along the right-of-way as received. To facilitate this process the contractor used a road grader to shape up ditches 16 ft. apart and a roadway between for the entire length of the contract. Temporary bridges were built at stream crossings, and all fences were equipped with gates.

Excavator lowering pipe into trench

Pouring a joint in the 48-in. line

Equipment used for excavating comprised two trench hoes of 3-cu.yd. bucket capacity and two of 1-cu.yd. size. One large machine was diesel-equipped; the rest were powered with gasoline motors. These machines did all the digging and were also used to lower the 7-ton pipe sections into the trench. A portable air compressor served the drills used to break up rock in advance of the excavators.

Performance figures for the four excavators are given in the following table:

Unit	Days Worked	Pipe Laid (Ft.)	Average Per Day (Ft.)	Conditions
3-yd. gasoline	301.5	42,510	141.0	85 per cent earth
3-yd. diesel	181	15,925	88.0	60 per cent rock
1-yd. gasoline	58	6,329	109.1	90 per cent earth
1-yd. gasoline	169	11,067	65.5	Stream crossings and other special work
Totals	709.5	75,831	106.9	

Job records show that the four trench hoes were actually engaged in digging or pipe laying during 75 per cent of the working time. The other 25 per cent was distributed as follows: repairs, 4 per cent; bad weather, 9 per cent; other work, 12 per cent.

In laying the pipe the usual procedure was to dig 12 ft. of trench to within a few inches of grade. Three laborers in the trench dressed the bottom, excavated block holes and cleaned out the bell of the preceding section. Two blocks were placed 6 ft. apart to receive the new pipe, which was lowered into place by a sling hung from the excavator bucket. Jute was placed around the spigot end of the pipe just before it was shoved home. Adjustment to proper line and grade was the final step. Jointing practice was conventional. Leadite, heated in portable furnaces, was poured by hand into the joint spaces through the usual sheet-metal funnel. One joint in the trench was always left unpoured to avoid possible damage from jarring when a new pipe section was placed. Each pipe-laying gang consisted of one foreman, three laborers outside the trench, three in the trench and from three to five more placing and tamping backfill on the sides and for a depth of 1 ft. above the pipe. In addition, there was one man handling leadite and an operator and helper on each excavator throughout the project.

Leakage tests on the line disclosed remarkably fine work. In the entire 15 miles of line only two joints blew out completely (due to insufficient bracing of testing plugs), and a third, poured in a very wet section during severe winter weather, proved defective for a length of 18 in. The specifications allowed a leakage not exceeding 300 gal. per inch diameter per mile of pipe per day, the pressure applied being equal to a head 50 ft. in excess of the maximum working pressure. Preliminary tests were made on sections varying from 0.3 to 1.8 miles in length. On one section 1.256 miles long the preliminary test showed a loss of only 4.46 g.p.m., equivalent to 107 gal. per inch diameter per day. Only four of the eighteen sections tested exceeded the allowance. For final tests the entire line was divided into two sections at the filter plant. One of these, with a length of 8.127 miles, showed a loss of only 89 gal. per inch diameter per mile; the other, 6.252 miles long, the remarkable figure of only 3.74 g.p.m., equivalent to 16.5 gal. per inch diameter per mile per day. This figure was so difficult to believe that it was checked and re-checked, but it was not successfully challenged.

Special construction along the conduit was limited to 43 entrance manholes, 28 blowoffs and 27 air valves; there were no shut-off valves. Brick manholes were installed at intervals of from 1,000 to 1,300 ft., their positions being marked by concrete posts of special design in order to help in locating them during the winter.

Contract for the work was awarded to Pepper Bros., Syracuse, N. Y., early in 1929. The work was started July 11, 1929, and the last pipe was laid on Aug. 14, 1930.

Tests Show That Hot Mixing Water Weakens Concrete

In tests conducted by the Minnesota highway department, as reported by the Highway Research Board concrete aggregates and water were heated to give batch temperatures of 70, 100 and 130 deg. F. when discharged from the mixer. The temperature of the mixing water was considered most important on account of its higher specific heat. To obtain the same workability, as measured by the flow table, it was necessary to add more water to the warmer mixes. The concrete specimens were tested by compression and cross bending. Time of set was determined by making several flow specimens and testing them at different intervals. The results showed that the warmer the concrete the more rapid the setting. Strength tests (3, 7, 14 and 28 days) showed that strength decreased as the temperature increased and that less than half the difference in strength was due to the additional water in the warmer concrete. For additional tests made at the different temperatures using a constant water cement ratio, the 28-day transverse tests showed that concrete placed at 130 deg. F. lost approximately 20 per cent of its strength.

Third of a Series of Articles on Distribution of Construction Materials

Can the Brickmaker Improve His Distribution?

By O. FRED ROST
Marketing Editor, The Business Week, New York

In preparation for the present article, the preceding one (*ENR*, Sept. 17, 1931, p. 441) outlined the influence of the venerable age of the brick industry upon its conservatism in distribution methods. From a factual survey of the industry it reported changes in transportation, in direct and dealer selling, and in style of product. Progress is apparent, but as the following exposition shows, this progress might well be accelerated. —EDITOR.

THE preceding article of this series (*ENR*, Sept. 17, 1931, p. 441) presented a broad analysis of current practices and major trends in the distribution of the various types of bricks. It was based on factual material gathered from many sources, and to a considerable extent represents the results of field work and careful personal investigations of distribution practices and processes now prevailing in a number of important markets. Obviously any intensive study of the functions or habits of an industry develops as a by-product certain definite conclusions. At the same time it leads to suggestions that, if acted upon, might become potent factors in improving the profit-making capacity of individual units, as well as the general condition of the entire industry. The present article will set forth the most important of these conclusions and suggestions, in the hope that they may lead to action.

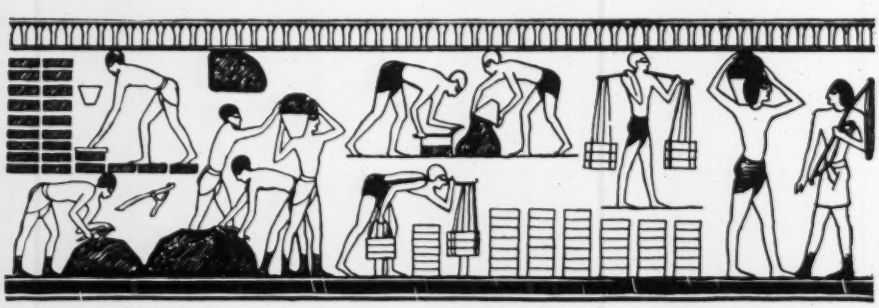
Indications are that if brickmakers will investigate the need for revision or refinement of their present methods or practices, and then so organize themselves as to provide more efficient and economical distribution and more carefully planned sales effort, they can increase the net earnings of their business. However, it must be remembered that any drastic revision of present practices by any one manufacturer should be preceded by proper consideration of *all* the factors involved. Necessarily this would include matters that are not directly within the scope of this study, and therefore cannot be here discussed. The policies of any individual producing concern are influenced by the personal ambitions of its owners, by its physical and financial structure, by its past record and future prospects, as well as by the nature of its producing and market territory. These and other factors, best known to the operator himself, should be fully considered before any new plans of operation are prepared or adopted.

Narrow Market Range an Advantage

Every one familiar with this subject will concede that the brick industry as a whole could undoubtedly improve its general state of prosperity if each individual unit were to correct at least some of its most apparent errors. Of these, many originate in a lamentable lack of sales-mindedness, that is rather widely distributed.

In the past the industry has been unduly conscious of the fact that the nature, weight and value of its products limit its opportunities, as compared with those under which other products are distributed and marketed. But, on the other hand the industry has failed to capitalize fully the actual advantages concealed within these limitations. Particularly it has overlooked its peculiar opportunity arising out of the fact that brick are manufactured in close proximity to their ultimate market.

Few manufacturers of building materials could hope to find a market for all of their output within a comparatively short radius of their factory. The brickmaker can do so. It will be recalled that study of the brick industry developed that brickmakers representing a very representative proportion of the country's total production sold more than 90 per cent of their entire output within 67 miles of their yard even under existing conditions. This means that the average brickmaker actually found buyers for most of his output within a two-hour motor drive or a three-hour trucking range. No manufacturer of competing products (with the possible exception of cement blocks) enjoys this same advantage. Lumber, for example, the most important competitor of brick, travels hundreds of miles and passes through numerous hands before it reaches its market. Compared with such an industry the brickmaker evidently is in a preferred position; he is able to cultivate intensively a market that by irrefutable proof lies at



How the Egyptians made brick, centuries before the Christian era, is shown in wall paintings in a tomb at Kurna, from which the original of the above sketch was made

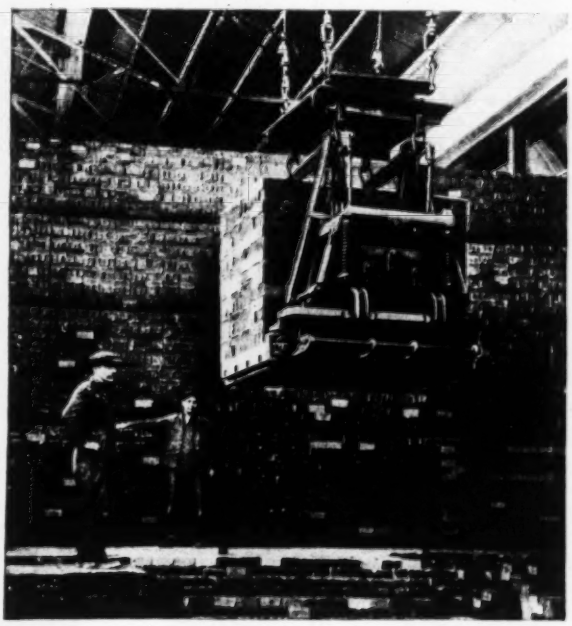
his very door. This being so, he should so organize his activities as to capitalize to the fullest extent his strategic advantage of a near-by market.

Analyze the Market!

The first step in that direciton must necessarily be a careful survey to determine the exact territory out of which a manufacturer may reasonably expect to obtain a satisfactory volume of business. Such factors as economic conditions of the region, previous consumption, territorial peculiarities, prospects and expansion, present state of supply and demand of industrial and residential properties, prospects for municipal construction activities, transportation facilities and others should be considered in the determination of a definite marketing area and its potential volume of business.

It is important to appraise carefully the type and capacity of competition that may be expected from other brick manufacturers located either within the same

A belt conveyor carries the "green" brick from the pallet for handloading into unit cars and transportation by narrow-gage track to the kiln



Stacking a unit of 1,500 brick in one operation by cradle and overhead crane. In a plant equipped for mechanical handling all moving of brick is accomplished in units of equal size

area or within a reasonable service radius of its border. The territory finally decided upon as a natural market area should be sufficiently large to provide ample margins of safety, so that the normal expectancy of available volume is substantially above the amount of business actually required for economical and profitable operation of that particular manufacturing unit.

However, under existing conditions no manufacturer should expect to operate at 100 per cent capacity. Each manufacturer should remember that any sustained effort on his part to obtain out of his territory a substantially larger share of available sales volume than is justified by his share of total production capacity will eventually result in profitless operation or even red-ink figures, not only for himself but for all of the manufacturers of brick involved.

Similar consequences generally occur where a brick manufacturer invades territory in which he cannot compete on an economically sound basis. The field survey upon which these articles are partly based uncovered a number of such instances.

A Case of Unsound Selling

In one outstanding case a large brick company located within 20 miles of one of the country's most important cities, found early in 1930 that business was exceptionally dull, and therefore decided to invade distant markets. By quoting a ruinously low price it obtained an order for a job almost 200 miles distant, although many makers of various kinds of brick were located in that vicinity. In retaliation some of these latter manufacturers invaded the logical territory of the invading manufacturer. A price war followed. Prices were driven down from $12 per thousand to $7.50. The only ones to profit by this procedure were the contractors and a trucking company that did much of the hauling. The brick manufacturers engaged in the war suffered substantial losses, and others operating in that area—innocent victims of the unsound practice—have since been forced to take business at these artificially lowered money-losing prices.

Obviously, then, it is important that the brickmaker should know in what area he can best serve himself and the industry at large.

* * *

After the territory has been decided upon, a definite plan for market development should be created and systematically followed through. Brick manufacturers can readily establish the necessary contacts with building supply dealers, architects, contractors and municipal bureaus in order to keep posted on contemplated or projected building and construction operations. They can at low cost concentrate sales attack upon known prospects, and by intelligently presented factual argument create not merely interest but often actual preference for their product. By personal solicitation they can eliminate much of the handicap that frequently obstructs the freer use of brick—a handicap which grows out of the fact that most contractors in charge of building operations have come from the ranks of the carpenters, and therefore lean toward other than brick construction.

They can cultivate greater cooperation with bankers,

mortgage companies and building and loan associations through keeping them intelligently informed on the particular benefits found in brick construction. In these and many other ways can brick manufacturers develop the market in their particular territory and prevent stagnation of their individual business. That most of them have not been doing this is deplorable, and it is this evident lack of salesmindedness that must be held responsible for the unsatisfactory conditions in which part of the brick industry finds itself.

How One Maker Succeeded

The case of one Eastern brick manufacturer is worth relating because it illustrates just what can be done when common sense is joined to intensive sales practice in the marketing of brick. Up to 1929 this maker had obtained the bulk of his business through brokers. When the depression hit him he did not simply accept it as an act of God; he did not close down his plant; he did not settle down to an indefinite wait until things would improve, as a number of his competitors in the same territory were found to be doing. Instead, he carefully surveyed the territory surrounding his plant and acted accordingly.

He decided that he could economically serve and should be able to obtain sufficient business from a territory within 45-mile radius. Then he inaugurated an intensive program of market cultivation. He now reaches high school children with brick propaganda. He distributes literature on brick to public libraries and preaches the use of brick in service clubs and other organizations. Every architect supply dealer and builder in the territory is regularly called on. The records on building permits are follwed closely, and more than one set of specifications has been changed from some other material to brick through his efforts.

That these activities have brought him results was proved by his books, although his figures could not be secured for publication. However, some measure of verification may be gleaned from the fact that early in 1930 he found it worth while to install mechanical handling equipment throughout his plant and on his motor trucks. Then, during the following winter, that of 1930-31, he bought entirely new brickmaking machines.

As to Mechanized Handling

Intimately tied into this obvious need for improved and more intensive sales effort on the part of individual manufacturers is the need for more general modernization or mechanization of the actual physical distribution of brick.

From time immemorial bricks have literally traveled by hand from oven to wall. While other industries mechanized many of their distributing operations, most of the brickmakers, through prejudice or perhaps for lack of funds—often for mere lack of vision—have kept on doing things by manual labor. Not even increasing labor costs with the resulting increase in the cost of brick-in-the-wall and corresponding rise in sales resistance have materially stimulated the desire for improvement in the handling of the product.

There is now available suitable equipment for the mechanization of handling operations through the kiln to the final point of use, and those who have had experience with it agree that the more general adoption of such modern methods of material handling would assist brickmakers decisively in meeting the competition of other materials.

Unloading of brick from barges is most commonly done by hand, almost as crude a method as those of the old Egyptian days

In many markets the sale of brick has suffered from the opinion, deep seated in the minds of the public, that it is substantially more expensive to build with brick than with some other material. Of course, actually, the price of brick alone is only partly responsible. Labor cost has been an important factor in establishing this opinion. These labor costs are divided into two classes: those incidental to the distribution of brick and those in connection with the actual laying of brick.

As far as the cost of laying brick is concerned, at the period of this writing we are witnessing a gradual reduction of labor costs. Where rates of wages have not actually been reduced, artisans are found to do more and better work, which is just another method of bringing down the final costs of a job. In one important city, where up to a year ago masons were laying 500 to 700 brick per day, many of them are now averaging nearly twice as many in the same number of hours and for the same amount of pay. If this tendency to give more work per hour increases, one of the important obstacles to the freer use of brick will be removed.

Getting Down the Transportation Cost

It is in connection with the labor of distribution, however, that brick manufacturers have their great opportunity to reduce costs. If brickmakers mechanize their operations as far as possible and thereby place themselves in position to give quicker service at an actual saving in handling costs, they will be able to obtain a more satisfactory share of business, particularly after building and construction operations are resumed on a broader scale.

The savings in handling costs that are possible through mechanization are not a matter of theory. One exceptionally well-managed brick company, selling about 20 million brick annually, found shipment by rail decreasing steadily and noted an increasing demand by its customers that delivery should be made by truck direct to the job. Experience had taught them that the loading of freight cars can proceed rather leisurely without causing any noticeable increase in the final cost of freight or any specific loss to the shipper; but they had also found through rather extensive experience that motor trucks must be kept rolling if they are to pay. Loading and unloading trucks by hand caused too much loss of time, and the saving in delivery cost of common brick that might be accomplished by dumping them at destination was frequently offset by resulting breakage.

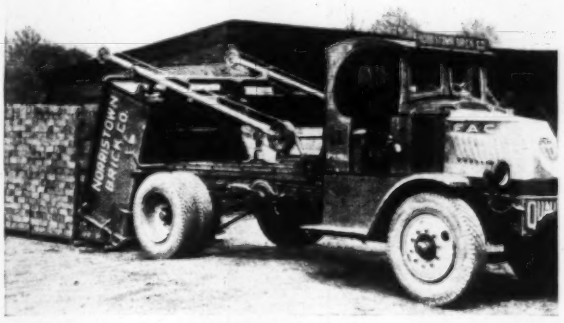
Thus the company concluded that in order to maintain its position in the territory and give its customers the demanded type of service, it would mechanize its handling operations. Since then its cost of handling and delivering has been reduced at the rate of from 50 cents to $1 per 1,000 brick, depending upon the length of haul. Incidentally the company's trucks are covering more ground; customers receive quicker service and are better pleased.

The experience of several other manufactures has been similar. Therefore the conclusion is warranted that mechanization of brick handling and transportation will before long become an imperative need wherever brick manufacturers undertake to cultivate their market, maintain a satisfactory sales volume and earn a reasonable profit.

The Industry Needs to Cooperate

One other reform is in order in the brick industry—namely, the merging of its several trade associations into one strong organization.

In the previously published critical analysis of the industry and the present article the term brick has been used collectively, because basic conditions found to exist in the several branches of the industry were so similar that a specific treatment of each branch separately would have involved much needless repetition. Yet this would have reflected the true state of consciousness in the industry.



One type of truck body is designed for mechanical handling of 1,000 to 2,500 brick. It can be obtained to fit any type of chassis and is part of the Fontaine System for storage and delivery of brick

Manufacturers of "common brick" maintain a splendid organization, but one that is confined to the one form of product. So do the face brick manufacturers. So do the makers of paving brick.

In its attempts to build new markets, the one organization urges the use of common brick for facing or for veneer. Some manufacturers select the best specimen of common brick and sell them as face brick at increased prices. Other members of that association actually make face brick as part of their general production. The face brick manufacturers, having a broader line which sells at a higher price, have been maintaining their association to follow through with propaganda for face brick. In the days when the brick industry was prosperous both associations conducted expensive campaigns, which in the final analysis were directed at each other and probably caused much confusion in the minds of the public.

Makers of paving brick, though they cater to a substantially different field, have many problems in common with the two other groups. Some of them have actually started to make other types of brick and thus have acquired a direct interest in the other branches.

Factors such as cited in this article, as well as many other factors, indicate that there exists a vital community of interests among makers of various types of brick. Through this it should be possible to effect the merging of the three present organizations into one. The single new organization would broadly promote the interests of the brick industry as a whole and give specialized service and attention to each of the three branches in its particular field. Constructive selling effort in behalf of each branch of the industry would undoubtedly prove more effective when conducted with the whole industry presenting a solid front, while the support of just one organization would effect some important economies benefiting all members. A single industry organization could also maintain a more efficient engineering research department through which new products and new uses for old products could be developed.

And Why "Common" Brick?

If the consolidation of the three existing trade associations in the brick industry is undertaken, such consolidation should be made the occasion for the elimination of the term "common" as designating any particular type of grade of product of the industry.

This is an age in which manufacturers of all types of products spend large sums of money to popularize a name and to impress the consuming public with the fact that names have a definite significance and a direct relationship to quality. Under such conditions it is unfortunate that an important industry should continue to employ a term that literally, and still more through current practice, invites depreciating inference and direct association with low quality.

It should be evident that none of the suggestions outlined involves insurmountable difficulties. Nor are any problems involved to which some industry has not already found a solution. The most formidable barrier to greater prosperity in the brick industry is a psychological one. This one will probably not be removed until economic conditions and intensive organized effort succeed in arousing a greater number of the guild out of the lethargy of traditional method.

The fourth article of this series on distribution of construction materials will appear in a later issue.—EDITOR.

1930 Gasoline Tax $494,083,410

In 1930 the gasoline tax in the entire United States yielded a net revenue of $494,683,410, according to reports received by the U. S. Bureau of Public Roads from state agencies. Nearly 15,000,000,000 gal. of gasoline was used. As compared with 1929, the tax revenue increased 14.6 per cent, and the average consumption per vehicle increased from 538 to 556 gal. The net revenue of $494,683,410 was allocated as follows: $1,102,187 for collection expenses; $338,927,564 for state highways; $96,225,637 for local roads; $20,869,901 for state highway bond payments; $19,179,135 for local road bond payments; $11,842,930 for city streets; $13,404,200 for schools, and $2,131,856 for miscellaneous expenditures.

LETTERS TO THE EDITOR

Unknowns in Earth Pressure

Sir—The short article by Prof. Krynine in your July 16 issue is a fine summary of some theoretical considerations on landslides. A close reading shows that a great number of unsolved problems are mentioned. The solution of these has been awaited by the engineering profession for many generations. Only recently has there been any active and connected work actually performed.

In stable banks or slopes the force causing sliding is less than the resistance to sliding. First, as to the former: The force causing sliding is the component in the direction of the sliding surface of the weight of the sliding volume. We do not know what the sliding volume is, for any but the simplest soils, nor do we know the shape of the sliding surface. Based on the theory of least work, for an assumed set of soil characteristics (density, coefficient of friction and cohesion), a solution can be worked out for the shape of the surface of minimum resistance. The reports of results published by Bell, Moulton, Meem and many others indicate a curve tending to be circular (although there is no proof further than deduction from cracks at the top and bottom of actual slides). It is important to remember that actual slides will not give true results of the mass which causes sliding or of the curve on which the mass tends to slide. As soon as motion occurs, and it probably occurs on small inner areas long before the entire mass moves, conditions change. For instance, the cohesion factor becomes smaller and may even reach zero.

By photographing, through glass side walls, sand retained by a rotating or sliding wall as such support is released Mueller Breslau and others pointed to a sliding surface which was practically plane. Theoretically, this result should occur only for materials with no cohesion and with a frictional coefficient independent of the depth of fill. Since cohesion disappears during motion, most writers of text books have taken it for granted (entirely illogically, of course) that all slip surfaces are plane. Prof. Krynine's criticism of the average text book is well deserved. Censorship of text books is not usual or popular, but, although the censorship committee would probably argue over a book for years, it would certainly eliminate a lot of misinformation given to the engineering student in "standard" texts on soils and foundations.

The other side of the equation, the internal resistance to sliding along any assumed surface, depends on the soil characteristics. Enough has been developed in recent years to allow a definite and consistent determination of such characteristics for any sample. It is important to get the proper samples, of course, and that is no easy matter in itself.

Prof. Krynine suggests the use of drainage to control the charactertistics of soils. He forgot to mention that drainage will help in clay, but that additional moisture will be needed in most sands. Even clean sand has a property similar to cohesion when moisture is present. This resistance to motion (caused by capillary action) is greatest at a moisture content of about 9 or 10 per cent, the same percentage of water that will cause a given weight of sand to assume the minimum volume.

The suggestion that piles be used to increase the resistance to sliding is not a theoretical consideration but a practical and economical practice. It has proved very useful in preventing slides on West Virginia road cuts. Advantage of this property of piles is taken in the design of bulkheads held back by ties anchored to piles. A similar procedure is employed in the construction of foundations on sloping rock sheets, where steel dowels are grouted into drilled holes. Such methods are common practice in various cliffs in Manhattan. Details can be found in an article by the writer in the Brooklyn Engineers Club Proceedings, April, 1930, p. 27.

Prof. Krynine mentions that for each soil there is a maximum height at a definite slope at which the slope becomes unstable. This fact was discovered many years ago and resulted in the use of berms on long slopes. The component short slopes can be made steeper than if one long uniform slope is built up.

The brief mention of the tests on piles under horizon pulls is a spark of hope. The writer has never found satisfactory solution to the problem of post and tower fou dations where horizontal pulls may occur either from later cable or guy loads with or without wind pressure. Nor h he ever found a theoretical solution which will prove w a telegraph pole, radio or transmission tower does not t over under unbalanced loads, with the shallow footings short buried lengths found in all practical cases.

That conditions change as actual rotation occurs there no doubt; the problem is to determine the maximum resi ance of the embedded length of pole or concrete tower fo ing before rotation occurs. The lateral resistance of circul piles and of the recently developed steel column piles wi a short penetration is very high, much higher than a present theory would indicate. Authoritative data on th subject would also explain some of the remarkable streng of sheetpiling. The writer assumes that a 5-ft. penetrati of sheetpiling in almost any soil except muck or quicksand equivalent to a fixed-beam support and reduces the momen caused by the soil pressure accordingly. Even this assum tion is considered conservative by most field men.

JACOB FEL
Consulting Engine

New York City,
Sept. 3, 1931.

Cost of Through Cantilever Bridge

Sir—I am constrained to comment on the through cantilever concrete bridge illustrated by photographic reproduction and described on p. 300 of your Aug. 20 issue. M comment is not intended to be harshly critical and is mad with no more information than the article referred t contains.

The bridge has a roadway 20 ft. wide, two footways, each 8 ft. wide, and is 516 ft. long, thus giving a useful area of 18,576 sq.ft. The cost is given as $435,000, which shows a cost of $23.40 per square foot of useful area of the bridge. In the United States, where we are supposed to have high costs and plenty of money, we would have used a much less expensive bridge at this location or would have had a much more pleasing structure for the same or less money. (This latter statement is made deferentially, as beauty in engineering is difficult to define.) That the thrifty Scot would pay more than $23 per square foot of usful area for a bridge of this type is surprising.

It is realized that we have no comprehensive idea of the foundation conditions, which would largely determine the type of structure with us, but it is evident from the description that the foundation conditions were not good. We might use, in a location such as this, a type similar to the Yellow-Stone River bridge at Sidney, Mont. (*ENR*., April 16, 1931, p. 671), at a cost of $11.74 per square feet of useful area or the Boise River bridge at Boise, Iowa (*ENR*, April 2, 1931, p. 381), $5 per square foot of useful area, or the Ohio River bridge at Ashland, Ky., (*ENR*, Dec. 25, 1930, p. 1931), at about $6 per square foot of useful area, or the White River bridge at Clarendon, Ark. (*ENR*, Sept. 11, 1930, p. 438), at about $6 per square foot of useful area. These bridges are respectively a series of steel trusss, a concrete arch, a continuous steel truss and a cantilever steel truss. Incidentally it may be noted that the old abutments were used in the South Esk River bridge in Scotland, while each of the bridges referred to had new abutments.

Without having enough information to determine reactions with a degree of accuracy, it would appear that the reactions at each pier are in excess of 18,000,000 lb., which with two cylinders, each 22.5 ft. in diameter, would give a pressure of about 22,000 lb. per square foot. The article states, however, that the foundation proved unsatisfactory when excavated and 32 concrete piles 14 in. square were driven in each cylinder to a bearing on rock. This would indicate a load of about 280,000 lb. per pile. Certainly 140 short tons per pile acting as a column in a bottom soft enough to permit the driving of piles 60 ft. long is rather a high loading.

HENRY G. PERRING.
Consulting Engineer.

Baltimore, Md.,
Sept. 10, 1931.

NEWS OF THE WEEK

Prevailing Wage Law Is Unconstitutional, Says Illinois Court

A STEP toward final determination of the legality of the Illinois prevailing wage rate law in effect July 1 was taken last week when a circuit court judge in Sangamon County declared the law unconstitutional. Two suits filed Aug. 2 attacked the law as a whole and called for an injunction on a specific piece of work. One charged that the law prevented freedom of contract between labor and contractor as well as prevented the state from accepting lowest bids. The other suit was filed by the attorney general of the state on behalf of the highway officials and attacked a section which limited the governor in the choice of an appeal board.

Continue to Award Contracts

In accordance with the custom the attorney general has told the highway officials to continue awarding contracts as though the law were legal until such time as the supreme court of the state can render a decision. It is planned to appeal at once and obtain a hearing at the October term of the supreme court in the hope that a decision may be obtained next winter before the spring bids are called for.

So much delay had been caused by the law that on none of the contracts recently let, totaling $4,500,000, will any large volume of work beyond grading be done this season. Proposals received Sept. 15, amounting to $3,000,000, are now under consideration.

Voters Approve Issue of Bonds for Colorado River Aqueduct

Voters of thirteen member cities in the Metropolitan Water District of Southern California on Sept. 29 approved a proposed $220,000,000 bond issue for the construction of the Colorado River aqueduct, early returns indicate. Returns from nine cities give a vote of 9,930 in favor of the bond issue and 3,745 against.

Out-of-State Concern Successful Bidder on Massachusetts Work

The Massachusetts department of public works has awarded a contract totaling $412,145 for road and bridge construction to the A. I. Savin Co., of Hartford, Conn., lowest of twelve bidders. The project entails 11,223 ft. of reinforced concrete and the construction of three bridges over the tracks of the New Haven railroad, the Blackstone River and Millbury St. in a section between Worcester and Millbury. P. J. Holland, of Lawrence, Mass., the second bidder, offered a bid of $426,505.55 for the job.

The governor's executive council tabled an approval of the award on the ground that the contract should go to a Massachusetts firm. A bitter controversy is expected to arise over this action, as this project is designated for federal aid. Federal aid was denied a project recently because of refusal of the executive council to award a contract to the low bidder, an out-of-state firm.

Relief for Engineers Now Out of Work Is Planned in New York

THE first step in a plan for the relief of unemployed engineers in the New York metropolitan area was taken on Sept. 23, when the directors of the Metropolitan Section, American Society of Civil Engineers, appointed a committee to take up the matter of unemployment among civil engineers. This committee has been instructed to consider putting into effect the proposals made to the board of direction of the American Society of Civil Engineers by its committee on salaries as the result of that committee's study of the unemployment situation. The recommendations of the latter committee are to come up for action at the meeting of the board in St. Paul on Oct. 5.

Basis of the Plan

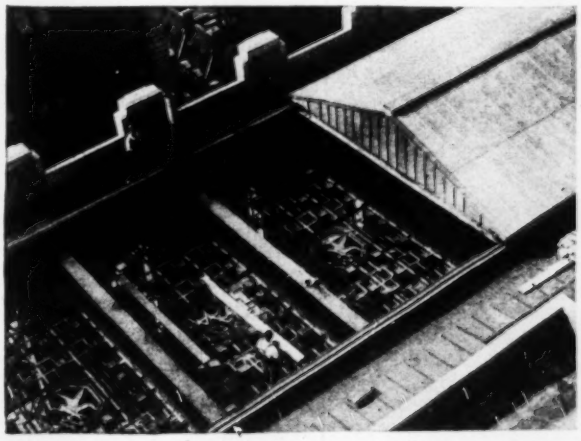
The plan which the committee on unemployment of the Metropolitan Section will consider as the basis of its final plan is as follows:

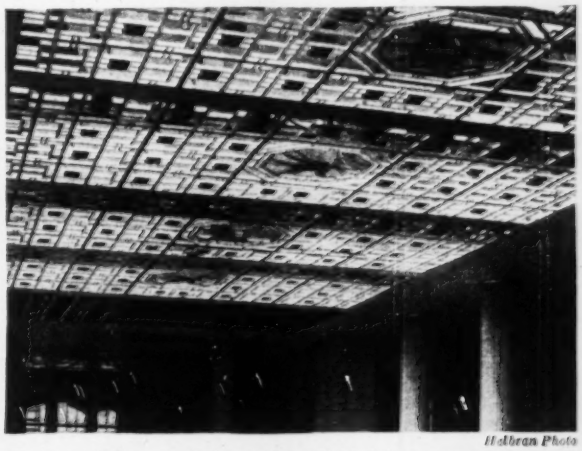
(*a*) The collection of a fund subscribed to by employed engineers for use in aiding unemployed engineers by loans or otherwise.

(*b*) A survey of the men in need of assistance, and a classification of them as to urgency of their needs.

(*c*) A survey by unemployed engineers of local opportunities for public work upon which the community can put a considerable number of unemployed men to work at short notice and a preparation by these engineers of

NEW WALDORF-ASTORIA HAS REMOVABLE ROOF





Hedbran Photo

These two illustrations show the removable roof over the central portion of the roof garden of the new Waldorf-Astoria Hotel in New York City. The arrangement is such that in fair weather the restaurant may be uncovered except for an ornamental grill. The movable part of the roof is divided into two sections which are mounted upon motor-driven rollers. Movement of the roof is electrically controlled from below. In the illustration may be seen the floodlights used to illuminate the restaurant.

estimates of the amount of work required on each project.

(*d*) The presentation of the results of these surveys to the local directors of unemployment relief in the community.

Part of the funds raised by the committee is to be used to finance the preliminary studies of the possible opportunities for public work, but once the work is put under way it is expected that the engineers will be transferred to the relief organization to carry forward the engineering or supervision of the work.

Loans may also be made from the fund to assist men whose needs cannot be met otherwise.

W. A. Bechtel Elected President of Six Companies, Inc.

W. A. Bechtel, Sr., formerly vice-president of Six Companies, Inc., which holds the contract for the construction of Hoover Dam, has been made president of that company, succeeding the late W. H. Wattis. Mr. Bechtel is president of the W. A. Bechtel Co., one of the member organizations of Six Companies, Inc. E. O. Wattis, brother of the late president, was elected to succeed Mr. Bechtel as first vice-president, and H. W. Morrison, vice-president and general manager of the Morrison-Knudsen Co., of Boise, Idaho, was chosen to succeed Mr. Wattis as second vice-president.

Mr. Bechtel is widely known throughout the West as a builder. During the seventeen years in which he has been engaged in business for himself he has specialized in heavy engineering construction, including railroads, dams, highways and natural gas pipe lines. At present the W. A Bechtel Co. holds with the Utah Construction Co. a joint contract for the construction of the Western Pacific R.R.'s new 112-mile line from Keddie north to Bieber, Calif., where it will connect with the Great Northern Railroad.

Hearing in Suit on Validity of Golden Gate Bridge Bonds

On Sept. 15 the California supreme court, sitting en banc, began the hearing in the test suit brought by the directors of the Golden Gate Bridge District to establish the validity of the $35,000,000 bond issue recently approved by the voters of the district. No action was taken by the court except to grant ten days for the filing of briefs.

The directors seek a writ of mandamus to compel the secretary of the district to sign the bonds. He had refused to sign them in order that the test suit might be brought to obtain a ruling on two points: first, the legality of the formation of the bridge district, and second, the power of the directors to levy taxes to meet bond interest and redemption payments. The court action was made necessary by the refusal of financial interests to buy the bonds until these questions had been settled.

Hoover Dam Notes

The first headings were holed through on the pioneer tunnels at Hoover Dam on Sept. 19. The headings on the inner Arizona tunnel between the adit and lower portal, 1,583 ft. apart, met on that date. Steady progress was made in driving pioneer headings on the other tunnels.

A number of 28-day cylinders were broken to determine the relative strength of regular commercial cement and a special low-heat rise cement. The superior strength of the commercial cement was very marked.

Six Companies, Inc., has awarded a subcontract to Shanahan Bros. for the construction of its railroad. Track laying was begun Sept. 15 at the intersection with the government railroad.

More than 13,000 cu.yd. of material has been moved in connection with street grading in Boulder City. A total of 13,800 ft. of sewers has been completed. The labor turnover during the week ended Sept. 19 was low.

Crane Erects 1,016 Tons of Steel in 9 Hours on Philadelphia Subway

On Thursday, Aug. 27, the erection forces of the Phoenix Bridge Co., engaged in erecting subway steel work at 26th St. and Pennsylvania Ave., in Philadelphia, erected in place in nine hours 1,016 tons of steel involving 71 pieces, each weighing a little over 14 tons. The work was done with a single erecting crane and is believed to be a record for the amount of steel set by a single tool in one day.

The subway structure consists of three lines of transverse girders and two lines of longitudinal girders supported on columns. The width of this structure is approximately 144 ft. and the length about 500 ft. It forms the roof of a tunnel at the junction of the Reading Company's subway tunnel leading out of the Reading Terminal and the Baltimore & Ohio Railroad tunnel leading from its passenger station.

The 75-ton crane with which the steel was erected operated on a dead track, but a large part of the steelwork was erected over tracks in use, two belonging to the B. & O. and four to the Reading Co. The work on the record day consisted in placing 71 of the transverse girders shown at the left in the accompanying illustration. In the forenoon of the following day the rest of the steel, about 500 tons, was set.

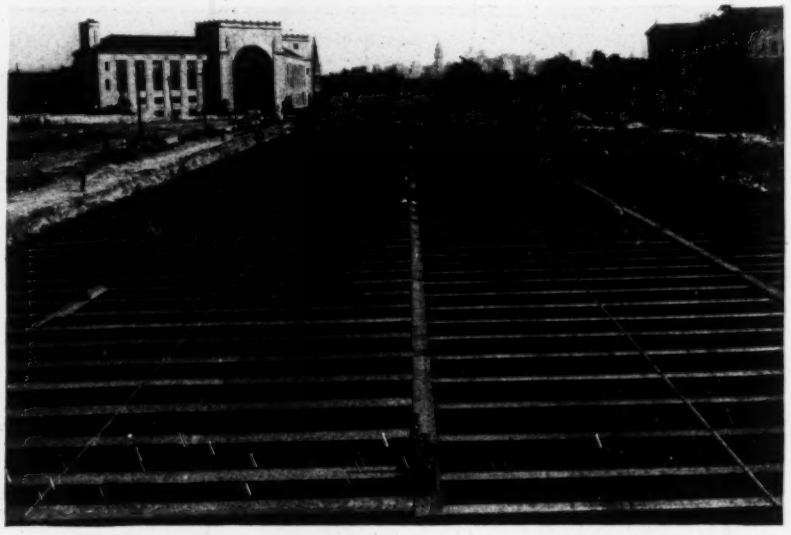
The work was done under the direction of the department of public works of Philadelphia, John Robinson being engineer in charge. For the Phoenix Bridge Co. J. F. Kinter was superintendent of erection and H. A. Archinal foreman.

California to Aid Unemployed by Extending Highway Work

To provide work for the unemployed during the coming winter the California state highway commission on Sept. 24 voted to put into effect construction work heretofore held suspended by the department of public works. The program proposed involves the expenditure of $2,691,500, of which $1,829,000 covers the estimated amount of projects in southern California and $862,500 work in northern California.

On Sept. 10 the commission voted to expend $1,500,000 for extra highway maintenance work during the winter, which will provide employment for between 3,500 and 4,000 men.

It is planned to have specifications drawn and bids advertised for so that work on these projects may be started within a month or a month and a half.



Subway structure in Philadelphia in which record tonnage of steel was set in nine hours

Road Relief Work Is Considered by Highway Officials

Engineering News-Record Staff Report

MEETING for the second time west of the Rocky Mountains, the American Association of State Highway Officials opened its seventeenth annual convention in Salt Lake City Sept. 28, with an attendance of more than 350 representing 44 states, the Territory of Hawaii and the Bureau of Public Roads. The opening session featured the annual report of executive secretary, W. C. Markham, who reviewed the past year of road construction and emphasized the importance of highway activity in relieving unemployment.

Figures from the report show that 25,997 miles of surfaced highway was added to state systems during the past year while legislative enactments added 6,390 miles. This does not include the wholesale addition of secondary roads which took place in North Carolina and Pennsylvania. Of the 321,000 miles in the recognized state systems, 93,744 miles, or 29 per cent, has some type of surfacing. This is a gain of 3 per cent over the previous year. There remains 28 per cent of earth roads in the systems, but 38 per cent of this mileage is graded to standard sections.

States' Obligation Increasing

The report stressed the growing problem of state obligation in local road improvement and the need for proper coordination of this work. It was stated as the position of the association that there comes a time in road improvement when the state should be obligated to help the smaller local units and that the percentage of the state system improved should be the basis for beginning such aid. However, local opinion has much to do with deciding this point and there is a tendency toward impatience in enlarging the state system that, in some instances, has loaded up state organizations without proper consideration of the state system or the finances required.

Of the 28 states that claim more than 70 per cent of their systems surfaced, 23 give aid to the counties. The degree of surfacing involves much diverse opinion; some of it falls into a temporary classification that will require almost immediate reconstruction. Fourteen states have less than 70 per cent of their state system surfaced and still provide county help.

Highway Organizations Commended

President H. H. Blood, chairman, state highway commission of Utah, in his address complimented the state highway organizations on handling a record volume of road work during the past year under most trying conditions. He mentioned the advantage of flexibility in highway work in relieving local cases of unemployment by proper allocation of funds to distressed districts. Further, the unemployment situation has become so acute as to warrant extreme measures, and state highway organizations should stand ready to modify existing policies as necessary to put the greatest number of men to work. In spite of the advisability of governmental economy, he urged that federal appropriations for highway work be maintained or even extended for the coming period.

Annual Convention of Canadian Good Roads Association

More than 300 delegates attended the annual convention of the Canadian Good Roads Association at Lucerne, Que., on Sept. 22 and 23. In his opening address President J. E. Perrault said that he looked forward to the adoption of uniform laws regulating highway traffic in the different provinces. S. L. Squires, Toronto, contended that as cities benefited more from highway construction than rural centers they should pay a larger proportion of the costs. Motor accidents at grade crossings were declared by A. D. Ferguson, of the bureau of economics, Canadian National Railways, to be largely due to carelessness of motorists, and he argued that they should pay for the elimination of such crossings. William Findley, Toronto, advocated construction of light summer roads in resort territories, particularly in the natural parks for the use of tourists. S. C. Stewart, minister of railways for Saskatchewan, was elected president.

Public Works Officials Discuss Unemployment, Taxation and Other Problems

MATTERS pertaining to municipal finance occupied a prominent part in the program of the twelfth annual conference of the International Association of Public Works Officials, held Sept. 24-26 in New York City. Present and probable future trends in taxation were ably discussed by Mark Graves, formerly commissioner of the department of taxation and finance and now director of the budget for New York State; the committee on uniform street sanitation records presented a report showing notable progress in its work of drawing up uniform accounting systems for municipalities; and a round-table discussion on unemployment relief, despite the fact that it was the last item on a full program, aroused such intense interest that it held an attentive audience a full hour beyond the scheduled adjournment time.

Governments on a Spending Spree

Mr. Graves, after briefly outlining the taxation set-up in New York State, pointed out that all governmental units, influenced by ample revenues during a period of prosperity, have been on what might be termed a spending spree, but that the present stagnant position of business and commerce, resulting in inevitable decreases in revenue, call for a period of retrenchment. This can be accomplished without abandoning any governmental functions by efficient administration and by reduction of waste. Events during the past ten years indicate the desirability of a surplus fund by governmental units, which could be accumulated by laying aside for future use a part of the revenue received during prosperous years. In discussing this paper, George E. Cavanaugh, superintendent of accounts and finance, Allentown, Pa., gave a description of the systematic scheme of assessment and taxation adopted by his city in 1915.

The system of uniform street sanitation records developed by a committee of the association aroused widespread interest during the past year. Installations at Brunswick, Ga., and Kenosha, Wis., have formed the subjects of reports published during the past year, and a report on Troy, N. Y., will soon be forthcoming. Other installations at Charlotte, N. C., and Winona, Minn., have been made, and Cincinnati, Ohio, will shortly be added to the list. Many other cities in various parts of the country have expressed interest; some of these will undoubtedly adopt the system. The committee's report was presented by Joseph J. Petranek, commissioner of public works, Cicero, Ill. The success of the system in actual practice was testified to by Alfred E. Roche, commissioner of public works, Troy, N. Y., and P. J. Hurtgen, director of public works, Kenosha, Wis.

Advance Planning for Unemployment

That public officials are fully alive to the need for advance planning for the relief of unemployed citizens during the coming winter was indicated by the interest displayed at the round-table conference. Methods of procedure in their respective cities were outlined by John F. Herron, president of the council, Pittsburgh, Pa.; Robert B. Brooks, director of streets and sewers, St. Louis, Mo.; E. A. Miller, supervisor of maintenance, department of public works, Rochester, N. Y.; I. E. Gottlieb, superintendent of sanitation, St. Paul, Minn.; H. D. Bradley, deputy street commissioner, Toronto, Ont.; and Carl Schneider, mechanical engineer, division of public works, New Orleans, La. In general, these cities provide work for needy cases rather than charity, funds being obtained by private contributions, city appropriations or bond issues, or from both sources. Steps taken include the registration of unemployed men, investigation of individual cases, assignment of work, which involves supervision by various city departments, and raising of funds. All cities reporting expected a greater need for relief work during the coming winter than was experienced last year.

The educational work among public officials being carried on by the New

York State Conference of Mayors formed the subject of a paper by William T. Capes, secretary of that body. During the first half of 1932 schools will be conducted for 22 separate groups of public officials, supplementing those already established for firemen, policemen, financial officials and civil service commissioners during the past three years.

Methods of public works administration in Indianapolis, Ind., were described by Wilbur H. Winship, street commissioner of that city. Indianapolis has reduced the cost of street cleaning from $150,000 annually to $97,000 annually, despite an increase in street mileage. Methods used at St. Paul, Minn., to perform 50 per cent more work than in 1921 under a budget 50 per cent less were outlined by Milton Rosen, commissioner of public works. During this period complaints have been reduced from an average of 100 per day to only five per day. At the same time an intensive campaign for cleaning up vacant land within the city limits has been carried on.

The department of sanitation of New York City was well represented at the meeting. William Schroeder, Jr., chairman, delivered the address of welcome; Leonard C. L. Smith, engineering member, described the organization of the department and its program of future work; and Charles F. Hand, lay member, also gave a short address.

Sewage Disposal

George A. Fuller, consulting engineer, New York City, delivered a paper prepared by J. R. McClintock which gave a step-by-step description of the activated sludge process of sewage treatment. This was supplemented by a description of a new type of treatment plant now in process of construction at Dearborn, Mich., delivered by Mark Owen, commissioner of public works and engineering at Dearborn. Here dependence is placed upon chemical and mechanical rather than bacteriological treatment. Most of the suspended matter is precipitated with lime and ferric chloride, after which the sewage is passed upward through a 3-in. filter bed of magnetite. Vacuum filters are used and the sludge is disposed of by burning. Although not as effective as activated sludge treatment, the Dearborn process is economical and is recommended for cities which do not require intensive purification.

Results of three years of operation of the Rochester, N. Y., municipal airport were reported by E. A. Miller, supervisor of maintenance, department of public works, who pointed out that a proper landing surface and suitable drainage are of extreme importance in airport construction. Rochester's experience indicates that, for the present at least, an airport cannot be expected to be self-supporting. The benefits of air transportation, however, justify some subsidy by the city.

Other subjects considered at the meeting included city planning, discussed by Flavel Shurtleff, secretary of the national conference of city planning; and street lighting, discussed by Alexander Anderson, of the New York Power & Light Corp., Albany, N. Y. There was also a round-table discussion of snow-removal methods.

Officers Elected

Business transacted at the meeting included a revision of the constitution, reducing the size of the board of governors from nine to seven members and providing for a director from each state or province containing five or more members of the association, as well as making other minor changes. The association adopted a resolution of thanks addressed to the trustees of the Julius Rosenwald fund and the University at Chicago for the financial aid advanced in developing the unified system of street sanitation records. Officers were elected as follows: president, H. E. Bradley, deputy street commissioner, Toronto, Ont.; vice-presidents, Carl Schneider, mechanical engineer, division of public works, New Orleans, La.; P. L. Costigan, superintendent of street cleaning, Washington, D. C.; and Mark Owen, commissioner of public works and engineering, Dearborn, Mich. A. M. Anderson and P. J. Hurtgen, director of public works, Kenosha, Wis., were reelected secretary and treasurer, respectively. Pittsburgh, Pa., was chosen as the location of the next conference.

British Builders Institute Inspects American Practice

A DELEGATION from the British Institute of Builders which arrived in New York late last week is now on a tour of the principal cities of the United States to observe American methods of building construction and their results. On Saturday, Sept. 26, the party visited the new McGraw-Hill Building at 330 West 42d St., New York City, where they were addressed by Willard Chevalier, publishing director of *Engineering News-Record*; Raymond Hood, of the firm of Hood & Foulihoux, architects of the building, and William A. Starrett, builder of the structure. The addresses were followed by an inspection of the building.

Col. Chevalier pointed out the specific characteristic of the building—namely, that it was planned with strict regard to its functions—to serve the business to be carried on within it and incidentally to minister to the good taste of the community.

Close Coordination in Planning

Mr. Hood outlined in some details the way in which the building was developed by the conference method, with owner, architect, builder and real estate expert sitting jointly on all problems from the very first day. The remarkably low cost of the structure, much below that of comparable buildings, was credited largely to this procedure. He also indicated how the functional development of the building led to a horizontal architectural scheme of the exterior as a logical result.

Col. Starrett spoke of the fact that the best building organizations think always in terms of two units, time and dollars. When it is possible for the builder to stand in a high type of fiduciary relation to the owner, so that he can participate in the planning throughout, the asset which he brings to the discussions is organized forethought. With 50 or 60 subcontractors on a structure and hundreds of sub-subcontractors there is vital need for this asset in planning as well as in executing the work. Col. Starrett then pointed out the rise of the place of management of modern buildings, the result of the evolution of the skyscraper. With fullest development of management craftsmanship follows automatically as a result. "The most expensive thing around the building," said the speaker, "is to create a situation where the craftsman is required to think." Because of this development we have departed far from the condition in Europe, where reverence for the rites of craftsmanship in building is almost excessive.

Welding as Supplement to Riveting

The party was later addressed by Fred T. Llewellyn, of the United States Steel Corp., on "Steel Construction." Mr. Llewellyn reviewed in brief outline the newest steps on the development of steel framing as a vital factor in tall building construction, coming finally to the new element of welding as a probable extensive supplement to riveting. The group was later addressed by Fred E. Schmitt, editor of *Engineering News-Record*, who referred to the important psychological factors in both the technical and economical position of the skyscraper.

The party of the Institute of Builders will be in Washington Oct. 1-3, in Pittsburgh Oct. 4-6, in Chicago Oct. 7-8, in Detroit Oct. 9-10, in Toronto Oct. 12-13, and in Montreal Oct. 14-15, leaving from Montreal by steamer on the latter day.

The party is headed by Richard A. Costain, of Richard Costain & Sons, Ltd., Liverpool and London, past-president of the Institute.

Voters Approve Refinancing of Nevada Irrigation District

By a vote of 414 to 86 the proposed refinancing plan for the Nevada Irrigation District in Nevada County, Calif., was approved at a special election held Sept. 14. The plan provides for the substitution of 4 per cent bonds, with a single maturity date in 1975, for the present 5½ per cent bonds with varying maturity dates, commencing in 1934. The success of the plan depends upon the willingness of the bondholders to exchange the bonds they now hold for the new issue.

Arthur Surveyor Appointed Head of Chignecto Canal Commission

Arthur Surveyer, consulting engineer and head of Arthur Surveyer & Co., Montreal, has been appointed chairman of the Chignecto Canal Commission. This body has been appointed to look into the question of constructing a canal across the Isthmus of Chignecto from the Bay of Fundy to the Straits of Northumberland. Associated with Mr. Surveyer on the commission will be David W. Robb, Amherst, N. S., and John Sowards, Kingston, Ont.

Mr. Surveyer is one of the most prominent of Canadian engineers, and his name is linked with many large undertakings throughout the dominion. His engineering company has undertaken the design and supervision of industrial works, waterpower developments, waterworks filtration plants, bridges and general construction, not only in the Province of Quebec but in other provinces.

California Concrete Pipe Makers Meet in Fresno

At the annual convention of the California Association of Concrete Pipe Manufacturers, held in Fresno, Calif., Sept. 4 and 5, the following officers were elected: president, H. W. Chutter, Fresno; vice-president, B. R. Pollard, Fresno; secretary-treasurer, A. A. Clark, Visalia (reelected).

During the two-day session national specifications for concrete irrigation pipe were set up. They covered design and test requirements, recommendations for installation practices and data regarding the proper use of concrete pipe for irrigation systems. The specifications will be printed in a booklet, which is expected to be available for distribution in about six months.

On the second day delegates inspected the plants of the Jourdan Concrete Pipe Co. and of Pollard Brothers.

Committee Appointed on Program of Federal Public Works

Walter S. Gifford, director of President Hoover's association on unemployment relief, has announced the appointment of a committee to concern itself with the general program of public works in the United States and its relation to next winter's unemployment problems. The group, to be known as the Committee on Program of Federal Public Works, will be headed by James R. Garfield, of Cleveland, a former secretary of the interior, who has consented to act as chairman.

All those appointed to serve with Mr. Garfield are members of the organization's advisory committee. They are William C. Procter, Cincinnati; Raymond Robins, Brooksville, Fla.; George Vincent, Greenwich, Conn.; Rufus Abbott, Chicago; Homer Ferguson, Newport News, Va.; Matthew Woll, Chicago; Leonard P. Ayres, Cleveland; John D. Ryan, New York City; Milton Esberg, San Francisco; Prof. Jacob H. Hollander, Baltimore; and John F. Tinsley, Worcester, Mass.

Mr. Gifford, in making the appointments, said: "The committee will concern itself with the general program of public works and its relation to next winter's unemployment problem. The committee will have placed before it the present program of federal, state and local public works. It will consider whether, in its judgment, any further useful federal public works could be undertaken to the advantage of the present unemployment situation."

Bonds Voted for American River Flood Control

By a vote of more than six to one the proposed issue of $565,000 in bonds was approved by the voters of the American River Flood Control District at a special election held on Sept. 15. The district includes the city of Sacramento, Calif., and a large area north and east of that city. The project provides protection to this territory from the floodwaters of the American River. To the amount furnished through the bond issue the state and federal governments jointly will add $301,000. The vote was extremely light, only 12,323 voting of the 40,803 qualified. It is estimated that the project will provide work for about 400 men.

WASHINGTON NOTES

By PAUL WOOTON

Washington Correspondent

Levee Contractors Are Paying Prevailing Wages, Gen. Brown Finds—Opposes Damage Claims

DOZENS of complaints alleging that levee contractors are not paying the prevailing wage of the region have been investigated by the Chief of Engineers. In no single instance, says Gen. Brown, have the charges been substantiated. Many make the mistake of confusing the wage scale of a labor union with the prevailing wage. They have been found to be quite different in many localities.

So far as Gen. Brown has been able to establish, contractors on Mississippi River work are treating their workers fairly. In many instances they prefer to keep their seasoned men when much cheaper labor is available. When vacancies occur, however, the replacement is made at the cheaper prevailing rate. The Mississippi River Commission continues to pay the workers it hires direct 15c. or more an hour above the scale paid by contractors. This is in line with the government's policy of maintaining the pre-depression wage rates.

Complaint also has been made that both contractors and the government are working their men long hours. Gen. Brown admits that the eight-hour day is not observed on the river, but he points out that flood-control work is specifically excepted in the eight-hour law. He denies, however, that men are required to work an unreasonable number of hours on force account projects. He understands that the men, with few exceptions, are glad of the opportunity to increase their earnings. He would not feel justified in establishing a six-hour shift without authority from Congress.

Labor Secretary Opposes Change in Prevailing Wage Law

Secretary of Labor Doak has stated that he is still opposed to any modification of the prevailing wage rate law. In its present form the law provides no specific penalty. The secretary believes, however, that inasmuch as the provisions of the act are made a part of every government contract involving building construction work, violations may be dealt with as violations of the contract, and departmental officials already have warned contractors that they must pay prevailing wages if they expect to continue to receive payment from the government.

In response to the suggestion that an advance determination be made of the wage rates prevailing in the various communities, Secretary Doak raises the objection that such procedure would not take care of fluctuations. This suggestion also is criticised by labor department officials on the ground that it would require too much time to determine the wages paid to building construction workers in all sections.

It is understood that bonding companies are objecting to the conditions that exist under the present act, because uncertainty as to wage payments tends to increase their responsibility. If a contractor cannot or will not pay a higher rate of wages under a ruling by the secretary, the bonding company would be required to finish the job.

So far only one ruling has been made by the secretary. This was in a dispute concerning the payment of painters on a federal building project in Washington and the secretary fixed a wage the same as the union rate. Labor department officials state that more than a hundred disputes have arisen concerning the ates of pay in federal building work, but that in almost every case a compromise was effected.

Opposes Changes in Flood-Control Act

Gen. Brown has made it clear that the resolution adopted at the recent flood-control conference at Memphis proposing that the federal government pay for lands that are damaged through the relocation of levee lines will not have his support. In view of what Gen. Brown considers bitter experiences of the government in attempts to purchase lands under the flood-control act he is prepared to oppose actively any liberalization of the act which involves land purchased by the federal government. He finds that local authorities can purchase lands at much lower prices.

New School Teaches Welded Building Design

The General Electric Co. has announced the opening at Schenectady, N. Y., of a school of welding design to teach engineers, architects and draftsmen, both in and out of its employ, methods of designing welded buildings. There is no charge for instruction in the course, which requires about four weeks for completion and which is flexible so that it can be adjusted to suit the individual.

A requirement of the course is that the applicant be an engineer or have some training in structural design or some experience in the design of riveted structures. It is then necessary for him only to learn the difference between the application of welding and riveting to steel frames.

The subject is approached from a scientific point of view based on studies and tests by the General Electric Co. over a period of years in welding work, particularly in the construction of its own factory buildings. The following design problems are being studied: typical Pratt truss; typical Warren truss; typical Fink truss; plate girder with concentrated and uniform loads; plate girder with concentrated moving loads; beam and girder connections involving various forms of brackets; column connections, including base plates and miscellaneous frames as desired by the students. In addition, there are included special features within the limits of frame structures.

Personal Notes

GEORGE W. WHITESIDE has resigned his position with the Illinois department of waterways to become assistant to the dean, engineering division, Oklahoma A. & M. College, at Stillwater, Okla.

B. ERNEST MCCOWN, of Proctorville, Ohio, has been appointed resident engineer for the Ohio state highway department in Lawrence County, with headquarters in Ironton, to succeed G. C. Kinley, of Portsmouth.

CHARLES E. DOUGLAS, recently engaged in a survey of city finances at Long Beach, Calif., has been appointed city manager of Glendale, Calif., to succeed J. W. Charleville, who resigned Sept. 1 to become city manager of Pasadena, Calif. Mr. Douglas has served as city manager in Lawton, Okla., Newport News, Va., and Dubuque, Iowa.

EARNEST BOYCE, associate professor of sanitary engineering at the University of Kansas and chief engineer of the Kansas state board of health, has been granted a leave of absence to take a year's course of study at Harvard under a Rockefeller Foundation scholarship.

ROBERT L. COOPER, city manager of Albuquerque, N. M., who resigned last May and later reconsidered that resignation, again resigned on Sept. 22. This time the resignation was accepted by the city council, although on the previous occasion Mr. Cooper was induced to reconsider.

Obituary

ANDREW H. CHRISTENSEN, vice-president and one of the founders of the Utah Construction Co., died suddenly on Sept. 22 at his home in Salt Lake City. He was 68 years old. The Utah Construction Co. is one of the units of Six Companies, Inc., which has the contract to build the Hoover Dam, and Mr. Christensen's death comes but nine days after the death of William H. Wattis, head of that corporation and also president of the Utah company. The Utah Construction Co. was formed by E. O. Wattis, William H. Wattis and Mr. Christensen more than 30 years ago, and the close association of the three men had continued ever since. Mr. Christensen took particular interest in railroad building and his company constructed more than 3,700 miles of railroad. It also built many dams for the U. S. Reclamation Service.

WILLIAM J. KARNER, retired civil engineer, died in Danville, Ill., on Sept. 22. Mr. Karner, who was 91 years old, was associated for several years with John F. Wallace, chief engineer of the Illinois Central Railroad, and went to the Panama Canal Zone with Mr. Wallace. For a time he was acting chief engineer on the construction of the canal. He was also for some time associated with James B. Eads in the construction of the Eads Bridge at St. Louis, Mo. He also worked in connection with preliminary plans for the construction of a proposed ship canal across the Isthmus of Tehuantepec, Mexico. Mr. Karner retired from active work ten years ago.

CHARLES J. CRAIGMILE, senior assistant engineer of the North Jersey Water Supply Commission, died last week in Detroit, having been stricken with appendicitis while on a motor trip. He was 42 years old. Mr. Craigmile was graduated from the University of Illinois in 1913 and became associated in 1918 with the water supply commission. He was one of the engineers engaged in the construction of the Wanaque reservoir and aqueduct, recently completed.

JAMES J. COUGHLAN, head of James J. Coughlan & Sons, Inc., of Boston, died on Sept. 21 from a heart attack. He was in his 68th year. Mr. Coughlan was a pioneer Boston subway builder, and handled many large tunnel contracts, including work on sections of the Washington St. tunnel in Boston, and the Dorchester tunnel. He recently completed a contract on the Wachusetts-Coldbrook tunnel for the Metropolitan District Water Supply Commission.

EDGAR R. HAWLEY, president of the Hawley-Richardson-Williams Co., Salt Lake City, Utah, died in that city on Sept. 14 of acute pneumonia. He was well known in the West as a heating and ventilation engineer. As a consulting engineer, he designed the heating and ventilating system for a number of large buildings, including the state capitols of Utah and Idaho.

SOCIETY CALENDAR

AMERICAN INSTITUTE OF STEEL CONSTRUCTION New York City; annual meeting, White Sulphur Springs, W. Va., Oct. 28-30.

AMERICAN SOCIETY OF CIVIL ENGINEERS, New York City; fall meeting, St. Paul, Minn., Oct. 7-9.

AMERICAN SOCIETY OF MUNICIPAL ENGINEERS, St. Louis; meeting, Oct. 19-26, Pittsburgh.

ASSOCIATION OF WESTERN STATE ENGINEERS, fourth annual conference, Sacramento, Calif., Oct. 28-30.

INTERNATIONAL CITY MANAGERS ASSOCIATION, Chicago; annual meeting, Oct. 7-10, Louisville, Ky.

NATIONAL MUNICIPAL LEAGUE, New York City; annual meeting, Nov. 9-11, Buffalo, N. Y.

NATIONAL SAFETY COUNCIL, New York City; twentieth annual safety congress, Chicago, Oct. 12-16.

NEW ENGLAND WATER WORKS ASSOCIATION, Boston; annual convention, Sept. 29-Oct. 2, Boston.

BOSTON SOCIETY OF CIVIL ENGINEERS on Sept. 23 made a trip to the Watertown (Mass.) Arsenal under the direction of Col. Tracy Dickson, and inspected the latest development in X-ray examination of welding and metallic structures. In the evening Col. Dickson delivered a lecture before the society showing the details of the centrifugal casting process used in the manufacture of ordnance at the government arsenal.

LOS ANGELES SECTION, American Society of Civil Engineers, resumed regular meetings on Sept. 16. Julian Hinds, chief designing engineer, Metropolitan Water District of Southern California, gave a short talk on the necessity of the proposed Colorado River aqueduct. A resolution indorsing the proposed bond issue to supply funds for the aqueduct was unanimously adopted. W. J. Fox, chief engineer, Los Angeles County Regional Planning Commission, addressed the section on "The Engineer's Part in Regional Planning" and Donald M. Baker, former president of the Los Angeles City Planning Commission, read a paper on "Mass Transportation."

MASSACHUSETTS STATE CONFERENCE OF PLANNING BOARDS will convene at Lowell Oct. 7-8. Representatives of five other states will attend the sessions. The central theme of the conference will be a concrete plan for the regional development of the Merrimac Valley. This includes a project for a scenic boulevard to link the White Mountains with the north shore of Massachusetts by a new Merrimac River route.

NEW YORK SECTION, American Water Works Association, held its annual meeting in Niagara Falls on Sept. 22. Walter McCulloh, engineer, Niagara Falls board of education, and former member of the Niagara Falls water commission, told the 125 members present that pollution of the Niagara River, Lake Erie and Lake Ontario is the big problem that confronts the municipalities of the Niagara frontier. Lockport's fight for a filtration plant was sketched by J. F. Laboon, consulting engineer.

NORTH DAKOTA WATER AND SEWAGE WORKS CONFERENCE will hold its third annual meeting in Fargo Nov. 5-7.

SOUTHWEST WATER WORKS ASSOCIATION will hold its annual convention in New Orleans, La., Oct. 19-21.

TACOMA SECTION, American Society of Civil Engineers, at its regular monthly meeting on Sept. 14 was addressed by C. S. McCormick, structural designer and building inspector of the city of Tacoma, on the subject "The Uniform Building Code" as prepared by the Pacific Coast Building Officials Conference.

Construction Equipment and Materials

Diesel Tractor Motor Developed

Several years of intensive research by the Caterpillar Tractor Co., Peoria, Ill., has resulted in the development of a heavy-duty motor of the diesel type for use in a slightly modified Caterpillar 60 tractor in place of the conventional gasoline motor. Commercial diesel oil is used, costing only one-third to one-half as much as gasoline, and fuel consumption is reported to be from 30 to 40 per cent less than with a gasoline motor of equivalent power.

The outstanding feature of the diesel is the fuel injection system, which is so coordinated with the combustion process as to maintain full rated power over long periods of operation, preserve combustion efficiency and balanced firing at light loads, provide satisfactory combustion quality under variable loads, show smooth operation over the entire operating range, reduce maintenance costs to a minimum and provide simple operating control.

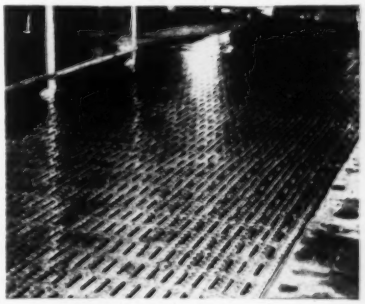
The fuel injection apparatus, of the precombustion type, is adjusted, regulated, timed and sealed at the factory. In the event of difficulty with the originally installed apparatus, the latter is removed and replaced by a complete set of spare fuel injection apparatus which is supplied with each tractor. This eliminates any need for making delicate adjustments in the field. All vital operating parts of the entire motor are completely inclosed and dustproof, this having been accomplished without minimizing accessibility and without endangering lubrication by contamination from fuel system leakage. Engine controls are centralized in one lever operated from the driver's seat, so that an operator accustomed to the gasoline engine finds himself confronted with the same means of controlling motor speed.

Starting power for the diesel is obtained from an auxiliary two-cylinder gasoline engine connected with the main flywheel through a clutch and a bendix drive. This system eliminates the complication of electric or compressed air auxiliary starting apparatus and is capable of exerting continued power to guarantee positive starting even under excessively unfavorable temperature conditions. Heat from the exhaust of the starting motor has a beneficial influence in starting the diesel.

For the present, production of the diesel unit is limited, and deliveries will be made only at selected points where the machines can be kept under close observation by the company's research division. Operations providing a full schedule of work—day and night—will be favored.

Slotted Floor Grating

A steel floor grating made of slotted plates which is proof against slipping in any direction has been produced by



New type floor grating

the Central Iron & Steel Co., Harrisburg, Pa. Because of its basic design, this grating requires no deep recess or rabbet in which to be set. As plates can be furnished in practically any gage and size up to 72x240 in., large panels can be used, simplifying the supporting framework. The plates allow free ventilation, drainage and passage of light and are light in weight; they are applicable to any installation where the ordinary grating is used.

Grading Machine Cuts Trench for Stone Shoulder

To meet highway specifications such as now used in Indiana requiring the excavation of a trench along the edge of a pavement and filling with crushed

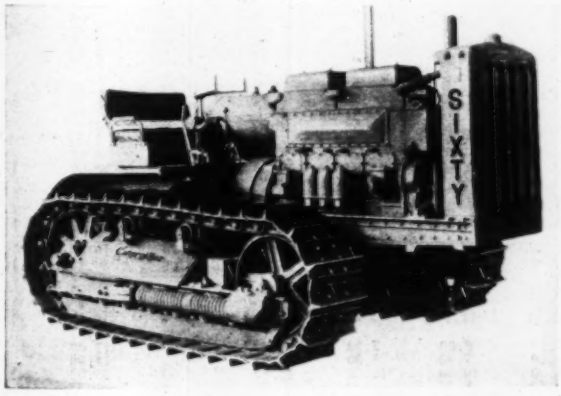
Grading and trenching shoulder by machine

stone or gravel to provide a solid shoulder, the Insley division of the National Equipment Corp., Indianapolis, Ind., has modified the Insley shoulder finisher by the addition of an extra blade attached to the inner end of the main blade. With the main blade set at the proper angle, the extra blade scoops out a trench 6 in. deep, 6 in. wide at the bottom and 18 in. wide at the top, a job which was formerly done by hand. When the filling is completed a shoulder is provided that will permit a motor car to run safely on and off the slab at high speed.

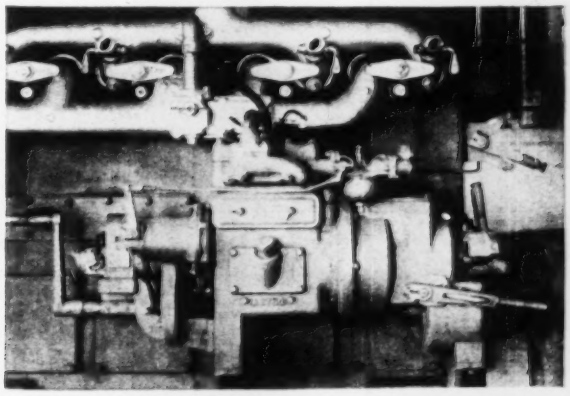
Fittings for Welded Piping

As the result of a special compression sizing operation that has been developed by the Midwest Piping & Supply Co., Inc., 1450 South Second St., St. Louis, Mo., this company has announced a new line of welding ells and other fittings made to exact radius and sectional diameter and in perfect round. Fixtures

(Continued on page 550)



Diesel-powered tractor



Small gasoline motor for starting diesel

Current Construction Unit Prices

Madden Dam in the Panama Canal Zone

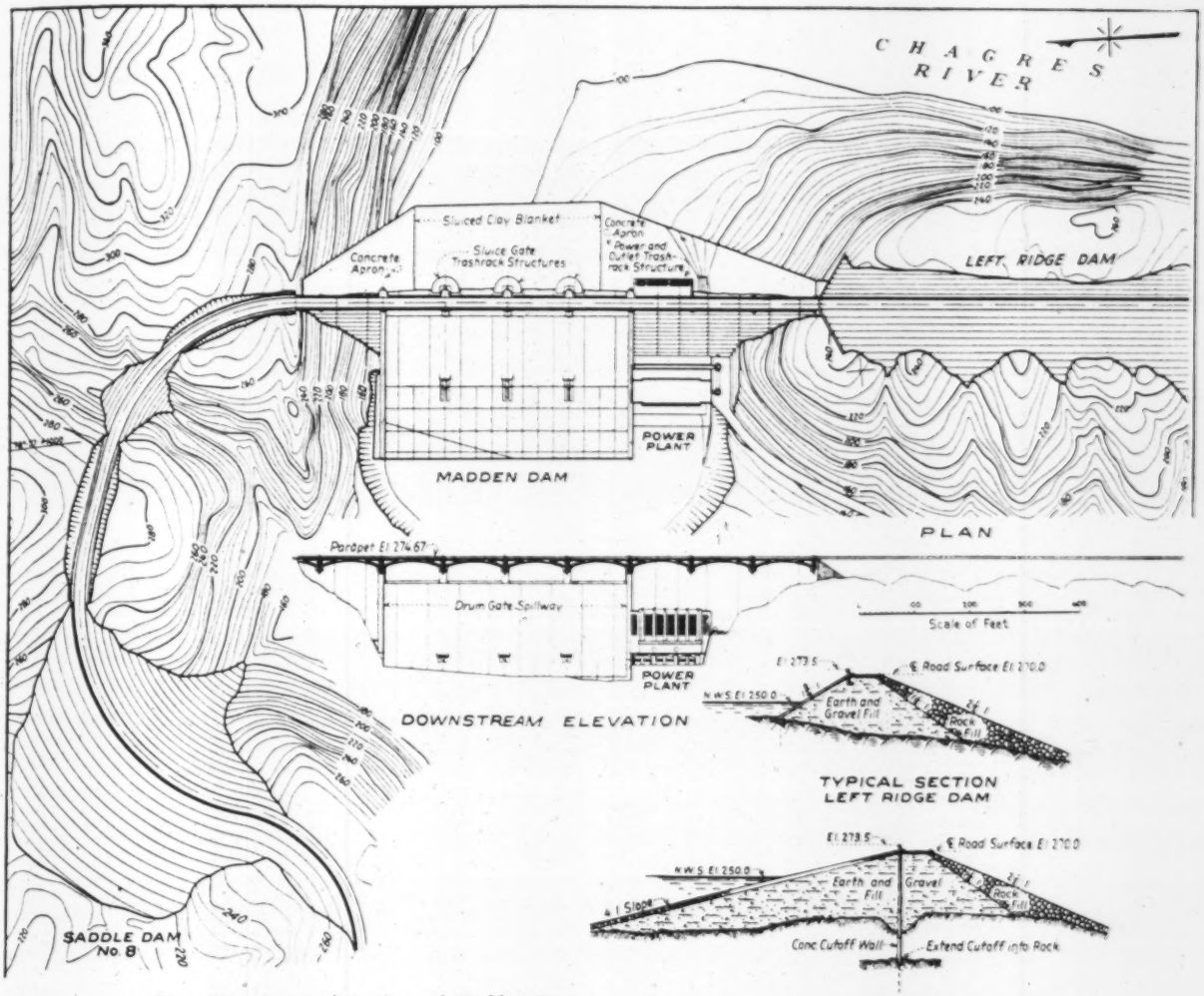
SITE of Madden dam and power plant is 10 miles upstream from the Panama Canal on the Upper Chagres River in the Canal Zone (extended). The structures consist of the dam and plant, the Left Saddle Ridge Dam, Saddle Dam No. 8, eleven other saddle dams, and some concrete road work. The contract for the project was awarded on Sept. 1 for $4,048,657 to the W. E. Callahan Construction Co. and Peterson, Shirley & Gunther, the lowest bidders. The next four bids were under $5,000,000.

The government furnishes the cement, reinforcing, anchor bars, rods, rails, metal pipe, conduit lining castings, machinery and all other materials that will make the finished structures. The contractor furnishes the crushed stone and gravel, sand and miscellaneous materials.

Embankment material is provided by excavation and by borrowpits located in the vicinity.

A complete list of unit prices is given for this project. Bidders were: (A) W. E. Callahan Construction Co., 122 Arcade, St. Louis, and Peterson, Shirley & Gunther, Omaha, Neb., contract; (B) Arundel Corporation, Baltimore, Md.; (C) Winston Bros. Co., Minneapolis, and Bent Bros., Inc., Los Angeles; (D) Hardaway Contracting Co., Columbus, Ga.; (E) Wales Corp., Charlotte, N. C.; (F) Frederick Snare Corp., 114 Liberty St., New York City; (G) General Construction Co., Seattle; (H) MacDonald & Kahn Co., Ltd., San Francisco, and Morrison-Knudsen Co., Boise. Plans were prepared by the U. S. Reclamation Bureau, and construction is supervised by the Panama Canal.

	A	B	C	D	E	F	G	H
Diversion and care of river during construction and unwatering foundations (lump sum)	$50,000	$350,000	$125,000	$175,000	$125,000	$129,411	$250,000	$400,000
58 acre clearing and grubbing	300.00	150.00	150.00	125.00	200.00	250.00	450.00	350.00
154,000 cu.yd. stripping for embankments and borrowpits	.40	.20	.47	.16	.50	1.50	.35	.60
29 acre plowing foundations for embankments	10.00	20.00	15.00	12.50	30.00	70.00	10.00	30.00
260,000 cu.yd. common excav. for Madden Dam and counterforted wall	1.50	.65	.80	1.00	1.80	1.50	2.50	3.00
173,000 cu.yd. rock excavation for Madden Dam and counterforted wall	3.10	3.20	3.40	2.50	2.30	2.00	4.50	5.00
3,000 cu.yd. rock excav. of cutoff trenches for Madden Dam	10.00	4.00	8.00	4.00	7.00	5.00	10.00	10.00
48,000 cu.yd. common excav. of cutoffs with side slopes for left ridge and saddle dams	.75	.25	.30	.30	.90	1.50	.75	1.00
100 cu.yd. common excav. of cutoff trenches for left ridge and saddle dams	2.00	1.25	2.00	1.00	7.50	1.50	3.00	4.00
2,200 cu.yd. rock excav. of cutoff trenches for left ridge and saddle dams	3.00	4.00	5.00	4.00	4.50	8.00	8.00	8.00
29,000 cu.yd. common excav. for highways	1.50	1.00	.75	.25	.80	2.50	.75	1.50
15,500 cu.yd. rock excav. for highways	2.50	1.00	1.40	1.25	3.00	4.00	1.50	3.00
600 cu.yd. back fill	.75	.75	1.50	.60	1.00	.30	1.00	3.00
25,000 cu.yd. earth blanket upstream from Madden Dam	1.00	.50	.90	1.00	3.00	.50	1.25	1.00
2,000 cu.yd. earth fills under upstream concrete aprons	1.00	.60	1.00	1.00	2.00	.50	1.25	1.50
1,000 cu.yd. earth fill at upstream toe of Left Ridge Dam	1.00	.60	.65	.75	3.00	.50	.80	1.50
146,000 cu.yd. earth fill in Left Ridge Dam	1.00	.60	.87	.60	.85	3.50	.75	1.50
95,000 cu.yd. earth fill in saddle dam No. 8	1.00	.50	.75	.60	1.00	3.00	.90	1.25
81,000 cu.yd. earth fill in saddle dam No. 5	1.00	.45	.84	.40	1.00	3.00	.75	1.20
29,000 cu.yd. earth fills in saddle dams Nos. 10 and 11	1.00	.60	1.10	1.00	1.00	3.00	1.00	1.15
41,000 cu.yd. earth fills in saddle dams Nos. 12 and 13	1.00	.45	.84	.35	.90	3.00	.80	1.25
72,000 cu.yd. earth fills in saddle dams Nos. 6, 7, 9, 14, 15, 16 and 17	1.00	.60	1.10	.70	1.00	3.00	.90	1.25
1,250 cu.yd. sand and gravel filling in spillway bridge	1.00	.80	2.00	1.00	2.00	.70	4.00	3.50
500 cu.yd. surfacing for highway parking space	2.00	.80	2.00	1.25	1.10	.70	1.50	4.00
17,000 sq.yd. preparing subgrades for highway paving by plowing and cultivating	.85	.12	.30	.10	.10	.20	.30	.25
4,100 cu.yd. placing 12-in. gravel blanket on upstream slope of saddle dam No. 8	1.00	.80	1.70	1.25	1.65	.70	1.50	2.00
3,200 cu.yd. placing 12-in. gravel blanket on upstream slope of saddle dam No. 5	1.00	.80	1.70	1.25	2.20	.80	1.75	2.00
11,600 cu.yd. dumped riprap on upstream slope of saddle dam No. 8	4.25	2.10	5.00	3.50	4.00	3.00	3.50	3.00
7,300 cu.yd. dumped riprap on upstream slope of saddle dam No. 5	5.25	2.10	5.00	3.50	4.00	3.00	3.50	3.00
60,100 cu.yd. rock fill in Left Ridge Dam	1.25	1.25	1.50	2.00	1.00	4.00	1.50	3.25
19,000 cu.yd. rock fill in saddle dam No. 8	1.25	1.40	1.50	2.25	1.00	4.00	1.60	1.80
24,000 cu.yd. rock fills in saddle dams Nos. 5, 12, and 13	2.75	1.40	2.60	2.10	2.00	4.00	1.85	2.00
10,850 cu.yd. rock fills in saddle dams Nos. 10 and 11	1.20	1.60	2.00	2.35	1.00	4.00	1.75	2.00
12,650 cu.yd. rock fills in saddle dams Nos. 6, 7, 9, 14, 15, 16 and 17	2.00	1.40	2.85	2.50	3.00	4.00	2.00	2.20
70 cu.yd. rubble masonry wall	12.00	10.00	25.00	11.00	15.00	10.00	18.00	20.00
18,400 lin.ft. drilling grout holes not more than 25 ft. deep	3.00	.60	1.00	.25	1.50	.50	1.75	1.00
5,400 lin.ft. drilling grout holes more than 25 ft. and not more than 50 ft. deep	3.00	2.00	2.50	.50	2.00	4.00	3.00	2.00
11,000 lin.ft. drilling grout holes more than 50 ft. and not more than 100 ft. deep	4.00	2.00	3.50	.75	4.00	4.00	3.00	3.50
600 lin.ft. drilling grout holes more than 100 ft. and not more than 150 ft. deep	4.00	2.00	4.00	1.50	5.00	4.00	4.00	5.00
600 lin.ft. drilling holes for anchor bars and grouting bars in place	1.00	1.00	.80	.75	1.00	.60	1.50	2.00
35,200 cu.ft. pressure grouting foundations	1.00	.30	1.00	.60	1.25	1.50	1.50	1.50
2,500 cu.ft. pressure grouting contraction joints	2.00	.60	4.65	.60	1.50	1.50	2.50	2.00
13,900 lin.ft. manufacturing and placing porous conc. drain tile in Madden Dam	1.00	.90	.75	1.00	2.00	.30	.65	1.00
300 lin.ft. laying 24-in. conc. gutter pipe	.50	1.30	1.20	.80	2.25	.20	1.50	2.00
600 lin.ft. laying 24-in. conc. pipe	.60	1.30	1.10	.80	3.25	.20	1.75	2.00
280 lin.ft. laying 15-in. conc. pipe	.25	1.00	.90	.60	2.00	.20	1.25	2.00
90 sq.yd. placing felt roofing and asphalt mactic wearing surface	1.50	1.00	1.50	1.25	1.50	1.50	1.50	2.00
450,000 cu.yd. conc. in Madden Dam	2.50	3.98	3.70	5.35	3.94	2.50	5.00	4.00
5,100 cu.yd. conc. in spillway training walls	3.00	11.50	7.00	7.50	6.25	5.00	8.00	10.00
11,170 cu.yd. conc. in spillway crest and piers	3.00	12.70	8.80	7.50	7.50	5.00	15.00	8.00
2,720 cu.yd. conc. in spillway bridge and in parapets on abutment sections of Madden Dam	10.00	30.00	20.00	20.00	19.50	10.00	25.00	13.00
5,900 cu.yd. conc. in trash rack structures	10.00	16.00	12.00	7.50	14.50	8.00	22.00	12.00
3,300 cu.yd. conc. in upstream aprons, slope walls and tailrace floor	10.00	11.50	9.00	7.50	9.50	3.00	10.00	7.00
750 cu.yd. conc. in counterforted wall	20.00	20.00	14.50	10.00	13.50	15.00	20.00	18.00
5,690 cu.yd. conc. in Left Ridge Dam, except highway paving and walkway	12.00	8.50	7.50	6.00	9.50	7.00	12.00	9.00
2,900 cu.yd. conc. in corewall and parapet for saddle dam No. 8	12.00	11.20	11.00	7.50	10.50	12.00	12.00	12.00
1,250 cu.yd. conc. in corewall for saddle dam No. 5	12.00	12.50	11.00	7.00	10.50	14.00	10.00	15.00
4,150 cu.yd. conc. in highway structures and highway and walkway paving, except over Madden Dam	5.00	7.30	8.00	7.50	14.50	7.00	12.00	9.00
10,300 cu.yd. conc. in power house below generator floor	10.00	13.50	7.50	7.00	7.50	4.00	11.00	8.00
4,700 cu.yd. conc. in power house above generator floor	15.00	20.50	14.50	10.00	19.50	9.00	25.00	11.00
10,400 sq.yd. special finishing of conc. surfaces	.60	.50	.95	.40	.50	.40	.15	1.00
150 sq.yd. placing ½-in. cement mortar finish	1.00	1.00	1.00	.50	.50	.40	.50	2.00



Plan, Elevations and Sections of Madden Dam

80 sq.yd. thin walls of metal lath and plaster	3.00	3.20	5.00	2.50	2.00	2.50	2.00	4.00
3,800,000 lb. placing reinforcement bars	.009	.018	.018	.015	.02	.03	.02	.02
10,000 lin.ft. placing copper expansion strips in contraction joints	.15	.25	1.00	.15	.25	.20	.40	.40
1,240 lin.ft. laying 8-in. diam. cast-iron soil pipe for highway drains	1.00	.30	.90	.40	1.00	.20	.75	.50
635,000 lb. installing standard steel and cast-iron pipe, fittings and valves	.025	.035	.03	.01	.03	.05	.05	.05
15,000 lb. installing control apparatus for high-pressure gates	.10	.10	.06	.01	.05	.06	.08	.04
705,000 lb. installing power penstock and needle valve discharge pipes	.02	.015	.02	.01	.015	.02	.02	.03
2,460,000 lb. installing high-pressure hydraulically operated gates and metal conduit linings	.0125	.01	.015	.01	.02	.02	.02	.0225
860,000 lb. installing butterfly valves	.02	.01	.015	.01	.02	.02	.02	.025
280,000 lb. installing needle valves	.02	.01	.018	.01	.02	.02	.02	.03
2,860,000 lb. installing drum gates	.0225	.02	.05	.01	.02	.03	.03	.0225
135,000 lb. installing traveling crane, trolley hoists and turntables	.02	.01	.028	.01	.02	.03	.03	.03
180,000 lb. installing structural steel for power plant	.01	.01	.028	.01	.02	.03	.03	.03
1,220,000 lb. installing trash rack metal work	.01	.01	.015	.01	.02	.01	.015	.02
37,000 lb. installing track rails	.01	.02	.01	.02	.02	.03	.015	.04
50,000 lb. installing metal stairways	.05	.02	.05	.02	.02	.02	.04	.03
6,400 lb. installing metal floor plates	.03	.02	.02	.02	.02	.02	.05	.05
550 lb. installing metal partitions	.20	.10	.20	.10	.10	.12	.05	.20
300 lb. installing sheet metal work	.20	.15	.40	.10	.10	.20	.15	.20
9,800 lin.ft. installing electrical metal conduit not larger than 1-in. diameter	.10	.10	.13	.06	.15	.15	.15	.20
2,000 lin.ft. installing electrical metal conduit larger than 1-in. diameter and not larger than 2½-in. diameter	.20	.30	.18	.10	.15	.20	.25	.20
700 lin.ft. installing electrical metal conduit larger than 2½-in. diameter and not larger than 4-in. diameter	.20	.70	.28	.12	.15	.30	.50	.30
450 lin.ft. installing fiber conduit	.20	.20	.20	.25	.30	.40	.25	.20
2,200 sq.ft. installing metal sash windows and partitions	.50	.50	.12	.25	.25	.40	.25	.30
15,000 lb. installing metal sash window operators	.10	.05	.12	.10	.10	.15	.12	.10
1,075 sq.ft. installing metal swing doors	.40	.50	.50	.60	.48	.60	.60	.50
275 sq.ft. installing metal roller door	.60	.50	.50	.50	.40	.80	.60	.50
100 sq.ft. installing wooden doors	1.50	.50	.50	.25	.30	.60	.50	.20
1,200 sq.yd. placing ceramic-tile floors	3.00	1.00	3.20	3.00	4.00	5.00	4.00	2.50
2,000 lb. installing plumbing fixtures and hardware accessories	.20	.20	.12	.15	.25	.40	.20	.20
54,000 lb. installing miscellaneous metal work	.10	.05	.06	.02	.10	.15	.10	.10
10,000 cwt. transporting materials of all kinds for the government or its agents, other than the contractor, in any amount between Madden Siding and the power house	1.00	.25	.70	.20	.20	.15	.20	.30
Purchasing from the government a used slack line excavator, pump, and washing and screening equipment (lump sum)	26,000	15,500	10,000	10,000	30,000	20,000	10,000	10,000
Totals	$4,048,657	$4,587,550	$4,651,683	$4,753,616	$4,881,239	$5,427,544	$6,236,152	$6,281,580

Fittings for Welded Piping

(*Continued from page 547*)

used in machining the bevels of the ell ends assure an included angle of exactly 90 or 45 deg., while quick and accurate lining up is facilitated by short tangents at each end of the curved section. Each ell is made from one piece of material and has one welded longitudinal seam along the inner circumference. Final working is in compression at a forging heat, thus normalizing and refining the metal in the plate and the weld, which is not extruded or stretched.

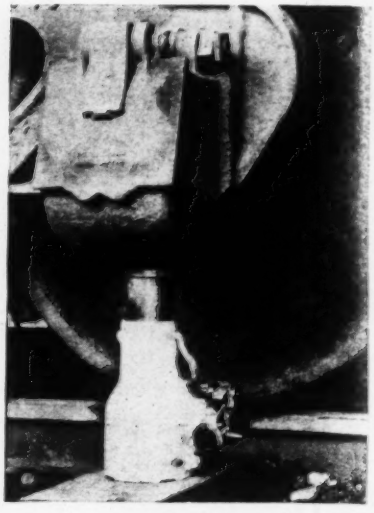
Fittings are available in all sizes normally used, and are made from the same material as mild steel pipe; consequently they have the same coefficient of expansion and the same welding characteristics. On special order, fittings can be made from wrought iron or from any of the standard alloys. Besides ells, the line includes heads, saddles and sleeves.

Welding sleeves and saddles

Railway Jack of Aluminum Alloy

A lightweight car inspector's journal jack weighing about 40 per cent less than former models has been placed on the market by the Duff-Norton Mfg. Co., Pittsburgh, Pa., for general railroad, industrial and contractors' use. Two sizes are available, the smaller having a capacity of 15 tons and a weight of 19 lb.; the larger, of 25 tons capacity, weighing 26 lb. Both models are equipped with a positive stop safety feature to prevent the lifting standards from becoming disengaged.

The saving in weight is made possible through the use of a heat-treated aluminum alloy sand casting as the housing for the steel lifting mechanism. This aluminum alloy shell is highly resistant to atmospheric corrosion and to the action of the sulphur-laden atmosphere frequently found where the jacks are used. Because of this and since the steel mechanism within the shell is packed with grease, the jack is practically impervious to weather conditions.



Lightweight railway jack

Business Notes

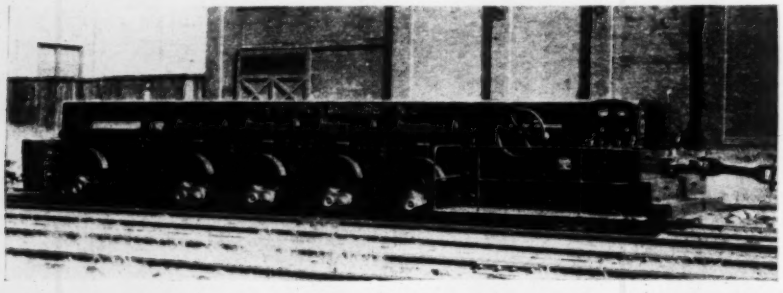
KOPPEL INDUSTRIAL CAR & EQUIPMENT Co., Koppel, Pa., has appointed H. E. Chilcoat general sales manager. He was formerly sales manager of the air dump car department of the company.

DOMINION BRIDGE CO. is about to start erection of the second unit of its plant at Vancouver, B. C. The first unit was completed about fifteen months ago.

THE NITRALLOY CORP., New York City, has completed the erection of a demonstration nitriding center at Detroit, Mich., in cooperation with the Electric Furnace Co., Salem, Ohio, and the Commercial Steel Treating Co., Detroit.

SOLVAY PROCESS CO., Syracuse, N. Y., is celebrating the 50th anniversary of its incorporation this month.

UNUSUAL LOCOMOTIVE DESIGNED FOR DOCKING LARGE AIRSHIP



When the newest and largest dirigible "Akron" arrives at its home station at Lakehurst, N. J., it will be assisted in docking by this unique locomotive designed and built by the H. K. Porter Co., Pittsburgh, Pa. With the nose of the ship fastened to a mooring mast, the locomotive, operating on a circular track, will swing the dirigible until it assumes a position parallel to the hangar. The locomotive weighs 264,000 lb., has eight 40-in. driving wheels, a length of 39 ft., a maximum height of 6 ft. and a width of 13 ft. It develops a drawbar pull of 60,000 lb. at all speeds from zero to 100 ft. per minute, and also has a second gear giving a maximum speed of 7 m.p.h. The power plant consists of a 250-hp. eight-cylinder LeRoi engine connected through a single reduction gear to a hydraulic pump which delivers oil under a pressure of 600 lb. per sq.in. to a hydraulic motor. The hydraulic motor connects with the driving wheels through a flexible coupling and speed-reduction gears. All shafts are mounted in Timken roller bearings. Gears and shafts, of special heat-treated alloy steel, run in a bath of oil. The locomotive frame is made of solid steel slabs, each weighing more than 22,000 lb. By means of a worm gear and hand wheel at the operator's stand, the flow of fluid from the pump can be so regulated that the hydraulic motor, and consequently the locomotive, can attain any desired speed from zero to its maximum, in either direction, without the slightest jerk or jar. Each bumper is fitted with a hydraulic tension meter unit so that the operator can read, at any time, the tractive force being applied. A similar unit is attached to a swivel yoke at the center of the locomotive.

New Publications

Pipe Coupling—Bulletin A of the VICTAULIC COMPANY OF AMERICA, 26 Broadway, New York City, discusses the application of Victaulic pipe couplings to steel, wrought-iron and cast-iron pipe and fittings in various industries.

Instruments—Devices for indicating, recording and controlling temperatures, pressure, temperature-humidity, moisture, time, gas analysis, condensation and liquid levels are described in great variety in a 103-p. general catalog 1000 issued by the C. J. TAGLIABUE MFG. CO., Park and Nostrand Aves., Brooklyn, N. Y.

Protective Coatings—"Special Protective Coatings for Industry" is the title of a new booklet issued by the WAILES DOVE-HERMISTON CORP., 17 Battery Place, New York City, which contains under one cover all essential data for the guidance of engineers and others concerned with the prevention of corrosion in various industrial fields. This is known as bulletin 505, and is illustrated with many photographs showing typical installations ranging from the Panama Canal lock gates to long-distance pipe lines and industrial equipment.

Pipe Installation — Catalog 7 of the ARMCO CULVERT MANUFACTURERS ASSOCIATION, Middletown, Ohio, describes the Armco jacking method for installing conduits, drainage openings and passageways under streets, highways and railroads.

Locomotives — PLYMOUTH LOCOMOTIVE WORKS of the Fate-Root-Heath Co., Plymouth, Ohio,, has issued a 12-p. illustrated bulletin describing Plymouth gasoline locomotives in 2½-, 3-, 3½- and 4-ton sizes equipped with Ford engine and four-speed truck transmission.

Poles — INTERNATIONAL CREOSOTING & CONSTRUCTION CO., Galveston, Tex., has issued a 16-p. booklet listing the cities in the United States that use creosoted pipe poles in business and residential sections.

Business Side of Construction

Public Contracts High; Private Total Lowest of the Year

CONTRACTS for the month of September totaled 177 millions, against 214 millions in 1930 and 326 in September, 1929. Private contracts dipped from a low of 66 millions in August to 48 millions in September. The public contracts total, on the other hand, rose from 82 millions in August to 129 millions in September, the second highest figure of the year. In the accompanying small table, these are subdivided into state, county, city and federal government work. The federal component is large in proportion to the subdivisions, because it includes practically all government contract work, whereas the state, county and city work includes only contracts of $25,000 or more. The evenness of the weekly totals is noticeable.

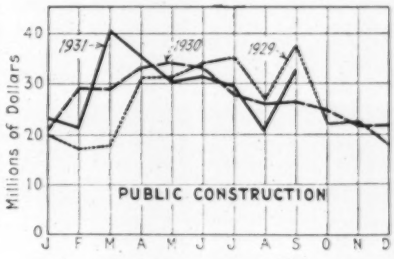
The two small charts on this page show the trend of private and public contracts as weekly averages of the last three years. For private work the last two years have been consistently lower than the year preceding each, with 1931 pointing toward zero.

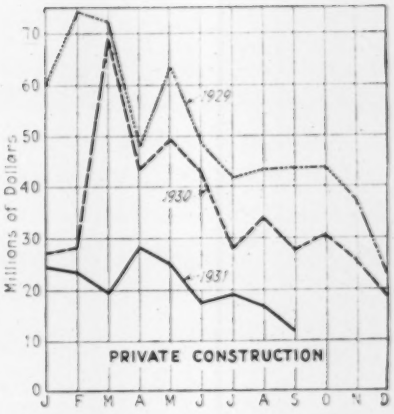
PUBLIC WORKS CONTRACTS BY POLITICAL SUBDIVISIONS

(Thousands of Dollars)

	State	County	City	Fed. Govt.	Total
Sept. 3..	$13,578	$1,774	$11,196	$22,987*	$49,535*
Sept. 10..	7,552	2,040	7,310	7,124	24,026
Sept. 17..	11,843	1,552	8,061	7,691	29,147
Sept. 24..	9,053	2,614	10,947	3,835	26,449
Total..	$42,026	$7,980	$37,514	$41,637	$129,157

* Includes $16,000,000 Chicago post office.

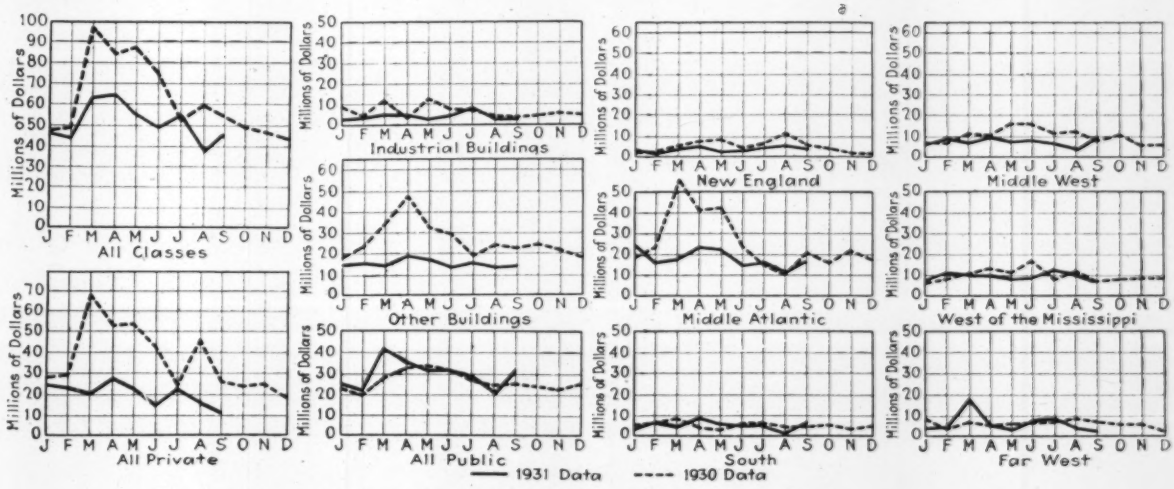




ENGINEERING CONSTRUCTION CONTRACTS REPORTED IN SEPTEMBER, 1931

Thousands of Dollars (000 omitted)

	New England	Middle Atlantic	South	Middle West	West of Mississippi	Far West	United States Sept. 1931	United States Nine Months 1931	United States Nine Months 1930	Canada, Sept., 1931
Waterworks	$203	$3,687	$1,375	$447	$345	$333	$6,390	$47,645	$35,291	$733
Sewers	337	1,574	1,860	2,809	418	7,733	7,733	55,262	65,723	450
Bridges, public	404	4,121	2,444	653	1,173	1,153	9,948	96,537	82,189	1,615
Excavations	176	106	133	1,018	846	86	2,365	17,814	21,038	272
Streets and roads	2,195	7,611	5,032	4,778	8,190	2,034	29,840	454,390	477,659	7,727
Federal government	645	9,872	5,434	18,980	4,281	2,425	41,637	223,295	86,607	.....
Unclassified, public	561	1,313	.....	1,988	301	590	11,388	64,487	85,034	442
Building, public	3,805	15,320	1,316	1,663	4,204	183	26,491	194,109	227,244	986
Total public	$8,326	43,604	17,594	32,336	19,758	7,539	129,157	1,153,539	1,080,785	12,225
Buildings, industrial	1,451	3,607	925	2,344	1,329	365	10,021	129,777	274,431	771
Buildings, commercial	2,740	17,937	1,478	1,625	556	1,110	25,446	427,663	824,760	2,448
Bridges, private	25	8	586	.....	.....	325	944	9,909	17,261	.....
Unclassified, private	456	6,543	197	2,775	835	582	11,388	244,226	370,935	.....
Total private	4,672	28,095	3,186	6,744	2,720	2,382	47,799	811,575	1,487,387	3,219
September, 4 weeks	**12,998**	**71,699**	**20,780**	**39,080**	**22,478**	**9,921**	**176,956**	.....	.....	**15,444**
August, 1931, 4 weeks	20,020	47,854	6,059	16,054	40,800	18,114	148,901	.....	.....	11,182
September, 1930, 4 weeks	22,862	86,204	16,719	35,084	27,266	26,065	214,200	.....	.....	15,559
Nine months, 1931	147,725	728,936	192,926	314,507	324,986	251,034	.....	1,965,114	.....	91,302
Nine months, 1930	223,048	1,053,047	207,355	431,753	392,629	260,340	.....	.....	2,568,172	146,337



Contracts awarded, showing trend by classes and sections

On public contracts 1931 reached the peak in March, and though the figures for the following months were below those of the preceding two years, the total for the nine months is 7 per cent above both 1929 and 1930. This comparatively satisfactory record for public construction is due to the very large increase in federal government work.

Wage Cuts, Strikes and Prevailing Rates

Wage cuts, strikes and further attempts to establish prevailing local wage scales form the principal elements of current news reports on labor conditions coming from correspondents in various sections of the country.

Reductions of 10 per cent became effective Oct. 1 throughout the steel, rubber and copper industries. Less sweeping pay slashes occurred in the textile, railway, fuel, iron and refractory industries. Others are expected as in the automotive and aluminum industries.

In several localities minimum wage rates have been fixed definitely for common laborers. In none of these agreements, consummated within the last month, has the rate exceeded 50c. or gone below 30c. per hour for work on public projects. Local reports are given below.

Buffalo—After a month's shutdown Great Lakes Cement Corp. is resuming production at its three mills.

Attica—Prevailing wage for common laborers fixed at 50c. per hour for this district, compared with 40c. formerly paid by local contractors on prison construction.

Rochester — International Hodcarriers, Building and Common Laborers' Union of America, Rochester local, is urging organization of common laborers following alleged cut of 30c. per hour, to 40c., increase from eight hours to ten hours.

New York—Strike of 125 excavation workers on Radio City projects ended Sept. 9. Rock drillers and steam-shovel operators had objected to regular pay instead of double time for overtime. Laborers, truckmen and dynamiters joined in a sympathetic strike.

Trenton—State highway commission proposes handling excavating and grading operations by day labor, awarding only paving to private contractors.

Lakehurst — Structural ironworkers on hangar construction at naval air station returned to work Sept. 14 after a strike which lasted five days. Trouble caused by alleged non-payment of prevailing wage. Present status is open shop.

Pittsburgh—Union scale adopted as prevailing wage on all public projects for Allegheny County. Electricians, carpenters, tile setters and terrazzo workers still on strike over foremen's wage controversy.

Baltimore—Wage cuts on work for city effected as follows: Carpenters 10c. per hour, to $1; steamfitters 25c., to $1.25; painters 14½c., to 90c. City scale has been higher than official union rates for several months.

Washington — Federal building program now employing 39,000 men. This number will be increased to 100,000 by Jan. 1, according to government estimates.

Cleveland—City proposes inclusion of minimum wage at 60c. per hour in all public contracts. Contractors would be required to keep payrolls open for inspection.

Dayton — Lathers, hodcarriers and plasterers struck Sept. 8 on local hospital projects, over wage cut of 27½ per cent. Organized contractors, it is believed, will refuse to renew wage contract with unions at expiration of present agreement.

Jackson—Operations resumed in plant of Jackson Iron & Steel Co., closed since May. Two hundred men given employment.

Chicago—State work amounting to nearly $10,000,000 is being held up pending settlement of the prevailing-wage question. Cook County appears to favor the union scale, which carries an official rate of 97½c. per hour for building laborers. The other counties object to the imposition of the scale rate on the entire state when it is held that the prevailing wage in the county districts actually averages 35c. per hour.

Rock Island—Wage rate for common laborers on county road work fixed at minimum of 45c. per hour.

Minneapolis—Several contractors on state highway work resort to court action, owing to alleged losses as the result of code which establishes minimum wage rate at 45c. per hour and maximum week at 48 hours. Hearing set for Oct. 10.

Oklahoma City — Minimum wage at 30c. adopted on state highway work, rate to be included in all bids submitted. Record low bids averaging $19,320 per mile were received in September, and in these 30c. rate was used.

Denver — Several local contractors have served notice of coming reductions. The former scale of $1.50 will be reduced to $1; $1.37 to 93¾c.; $1.25 to 87½c.; 84½@81½c. to 62½c.

Salt Lake City—Contractor on two local federal building projects was discovered paying wages below prevailing scale. Contractors must adopt prevailing rate or secretary of labor will be called on to act as arbiter in the case.

Sacramento—Senate bill 83 prohibits the employment of aliens on state projects but does not mention non-residents of the counties in which the work is located.

Los Angeles — Operating under a freeholders' charter Los Angeles is exempt from the necessity of observing state prevailing-wage law covering municipal projects, rules the city attorney.

San Francisco — City charter and state law in conflict over question of employment of aliens on public works. Former will admit those who have first papers, while latter requires full citizenship for employment by state, county or municipality.

Seattle—Only 40 per cent of sawmill and logging camp workers employed in this section in 1929 now have work. Emergency employment wage temporarily fixed at $4.50 per day, with likelihood of reduction later to $2.50@$3, in order to spread available public construction work among increasingly larger number of men.

CHANGES IN HOURLY RATE OF WAGES IN TWENTY-EIGHT CITIES

	Carpenters		Bricklayers		Plasterers		Ironworkers		Common Laborers	
	July 15	Sept. 15	July 15	Sept. 15	July 15	Sept. 15	July 15	Sept. 15	July 15	Sept. 15
Albany, N. Y.	$1.00@1.25	$1.00@1.25	$1.25	$1.25	$1.25	$1.25	$1.25	$1.25	.....	$0.75
Akron, O.	1.15	1.55	1.45	1.55	1.62½	1.62½	1.25	.....	$0.40@0.50	.50
Amarillo, Tex.	1.00	1.00	1.50	1.50	1.50	1.62½	.....	.....	.35	.30@.50
Anderson, Ind.	.85	.90	1.00	1.10	.95	.95	1.10	.....	.40	.40
Birmingham, Ala.	.55	.40@.75	.80	.60@1.00	.75	.....	.85	.60@.90	.30	.20@.25
Butte, Mont.	1.25	1.12½	1.75	1.62½	1.75	1.62½	1.00	1.12½	.72	.65½
Canton, O.	1.15	1.15	1.50	1.25@1.50	1.25@1.50	1.25@1.50	1.00	1.00	.50	.40
Cincinnati, O.	1.00@1.40	1.00@1.40	1.25@1.62½	1.25@1.62½	1.25@1.62½	1.25@1.62½	1.00@1.40	1.00@1.40	.40@.60	.40@.45
Detroit, Mich.	.60@.80	.60@.80	1.00@1.50	1.00@1.50	1.37½	.90@1.37½	1.00@1.25	1.00@1.25	.30@.50	.30@.50
Duluth, Minn.	.90@1.00	.90@1.00	1.30	1.30	1.30	1.30	1.00@1.25	1.00@1.25	.50@.65	.50@.65
Durham, N. C.	.40@.60	.40@.50	.50@.75	.60@.100	.50@.75	.70	.....	.....	.20@.25	.20@.25
Evansville, Ind.	.....	1.25	.....	1.50	.....	1.50	.....	1.25	.....	.30@.35
Helena, Mont.	.....	1.00	.....	1.25	.....	1.00	.....	.....	.....	.50
Los Angeles, Calif.	.87½	.75@.87½	1.12½	1.00	1.12½	.87½@1.00	.90@1.00	.75@1.00	.50	.50
Louisville, Ky.	1.00	1.00	1.50	1.50	1.62½	1.62½	1.25	1.25	.30@.40	.25@.30
Memphis, Tenn.	.85	.85	1.62½	1.62½	1.50	1.50	1.25	1.00@1.25	.30	.15@.30
Milwaukee, Wis.	1.10	1.10	1.40	1.40	1.25	1.25	1.20	1.20	.40@.45	.50
Nashville, Tenn.	.50	.50	1.50	1.50	1.50	1.50	.....	.....	.25	.25
Oklahoma City, Okla.	.60	.60	.65	.65	.65	.65	.75	.75	.30	.20
Phoenix, Ariz.	.62½@1.00	.62½@.87½	1.00@1.50	1.00@1.50	.75@1.37½	.93¾@1.00	.62½@.87½	.....	.37½	.37½
Portland, Me.	1.00	.75@1.00	1.40	1.40	1.40	1.40	.....	1.50	.45@.55	.47½@.50
Portland, Ore.	.50	.50	.50	.50	.50	.50	1.37½	1.37½	.50	.35@.40
San Antonio, Tex.	1.00	1.12½	1.50	1.50	1.50	1.50	1.00	1.12½	.31¼	.31¼
San Diego, Calif.	.75@.87½	.75@.87½	.75	.75	.75	.75	.80@.90	.80@.90	.40@.62½	.40@.62½
Seattle, Wash.	1.12½	1.12½	1.50	1.50	1.50	1.50	1.12½@1.25	1.12½@1.25	.70	.70
Topeka, Kans.	1.00	1.00	1.50	1.50	1.50	1.50	1.00	1.00	.40	.40
Tulsa, Okla.	.75@1.10	.60@1.00	1.00@1.25	.75@1.00	.90@1.10	.75@1.00	.90@1.00	.65@.80	.35@.40	.20@.35
Urbana, Ill.	.....	1.25	.....	1.50	.....	1.50	.....	1.25	.....	.70@.85
Aver. 46 Cities	$0.94	$0.95	$1.27	$1.28	$1.21	$1.24	$1.13	$1.15	$0.44	$0.44

Few Price Changes in a Dull Market

There were few price changes in September, though brick, tile, lime and pine timbers are slightly lower than a month ago. The average price decrease of the principal thirteen materials in the accompanying table is 10.9 per cent from the level of Oct. 1, 1930. All items except steel shapes are down. Notes on the various materials:

Cement—Prices are holding, despite slackness of current demand. Rate of shipments, most of it to contractors, is 15,000,000 bbl. a month, compared with 20,000,000 a year ago. Stocks are heavier than at this time last year by about 487,000 bbl., or 2 per cent. Reported price changes were: advance of 13c. per barrel, to $1.95, Baltimore; drop of 25c., to $1.60, New York; drop of 10c., to $1.79, Jersey City.

Aggregates—Sand and gravel hold steadily to September prices; crushed stone is down 5c. per ton at Baltimore, to $2.80, and 25c. per cubic yard in Dallas, to $3.

Steel—September started with lettings of 58,000 tons of fabricated structural steel in the first week, the heaviest since the week of April 25, which totaled 63,000 tons, the peak for the year. It is to be noted that October normally shows a gain in bookings. Mill base remains steady, and there is little fluctuation in warehouse quotations on any form of steel. Except for construction, buying is confined to limited quantities. The general reduction of 10 per cent in steel labor costs may inhibit any attempt to advance the mill base artificially, yet with manufacturers claiming a too narrow margin of profit, there is no visible expectation of lower prices for fourth-quarter contracts. Mill operations are 29 per cent of capacity, the low point of the year, yet the trend is down.

Brick—Common advanced 50c. per thousand, to $15.50 at Detroit, this month, and declined $1, to $11.50 New York, and $1.50 to $13, in Dallas.

Lime—Hydrated lime is off at New York, with demand especially dull. Here finishing lime is down $1 per ton, to $17, and common $1.50, to $14, compared with September prices.

Lumber—The situation on the east coast is more serious than ever before. Not only is there overproduction but manufacturers in the Northwest have contracted for much larger steamship space than is necessary to fill the small volume of order for Eastern consumption. In some quarters it is suggested that October water shipments from the west coast be withheld altogether, in order to avoid overloading the market with distress lumber. Sawmills will likely run at not more than 60 per cent of capacity for the remainder of the year. Mill stocks for the country are now at 3,600,000,000 ft., compared with 4,000,000,000 ft. a year ago. While stocks are lower, there is but 15 per cent of this lumber already sold, as against 18 per cent at this time last year. Lumbermen are opposed to the proposed freight increase, claiming that it would be absorbed by the industry and would not be passed on to the consumer. The largest single movement of lumber east from the Pacific Coast this year came in a special train over the Rock Island Lines, of 70 steel boxcar-loads of sugar pine from the Sierras. This material will be used for sash, doors and other woodwork in buildings, and for foundry patterns. The shipment left California Sept. 21, dropping cars at points beginning with Omaha eastward to the Atlantic seaboard.

Asphalt—Though buying is declining seasonally, there were few declines in September. Two of them were: Dallas, 50c. per ton, to $19.50, and St. Louis $2, to $19.50.

Cast-Iron Pipe—Present prices are purely formal, and production is 50 per cent of foundry capacity for the industry.

AVERAGE DELIVERED PRICES

	Oct., 1931	Sept., 1931	Oct., 1930	Per Cent Decline in Year
Cement, bbl., net	$1.97	$1.97	$2.46	19.9
Gravel, ton	2.13	2.13	2.27	6.1
Crushed stone, ton	2.19	2.19	2.36	7.2
Sand, ton	1.55	1.55	1.74	10.9
Tile, 4 in., ea	.074	.075	.09	17.7
Brick, M	12.62	12.65	14.12	10.6
Lime, hyd., fin. ton	19.14	19.23	21.73	12.0
Pine, 3x12, M. ft.	59.64	59.73	62.18	4.0
Fir, 3x12, M. ft.	42.40	42.40	46.60	9.0
Sewer pipe, 12 in., ft.	.396	.396	.575	31.2
Steel shapes, mill, 100 lb	1.60	1.60	1.60	0.0
Rein. bars, mill, 100 lb.	1.60	1.60	1.70	5.9
C.i. pipe, 12 in., mill, ton	34.50	34.50	37.25	7.2
Average decrease				10.9

Capital and Contracts

Issues of new capital totaled but $2,000,000 in the week of Sept. 26. None of the bonds was for private construction purposes, marking the second week during September in which private financing was absent from the market. Total for the week of Sept. 5 was for public works only.

The average week in September was $24,000,000, compared with $56,500,000 for August and $84,000,000 in September 1930. The principal three issues of the week were: Cuyahoga County, Ohio, 5s, $1,000,000; Multonomah County, Oregon, 4½s, $300,000, and Montgomery County, Md., 4½, $200,000.

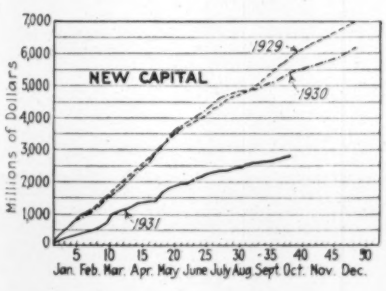
This week's contracts, with comparisons, are as follows:

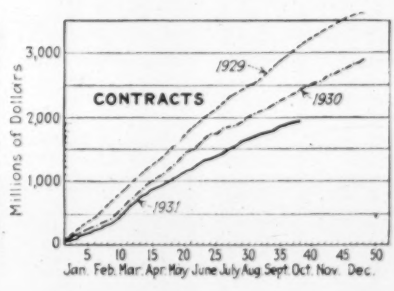
(In Thousands of Dollars)

Buildings:	Oct. 1, 1931	Average of Last Four Weeks 1931	1931
Industrial	$9,519	$4,233	$4,664
Other	13,825	13,197	24,931
Streets and roads	6,421	6,268	12,040
Other construction	25,007	17,514	13,253
Total	$54,772	$41,212	$54,889

Total, all classes, Jan. 1 to Oct. 1:

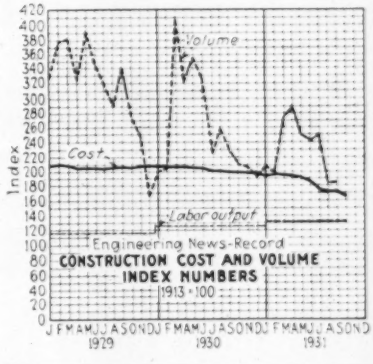
1931	$2,020,003
1930	2,624,596





Construction Cost and Volume Index Numbers

The Oct. 1 cost index number (169.78) is 1.1 per cent under that for Sept. 1 and 14.6 per cent below the index for Oct. 1, 1930. October cost level is the lowest since that for July 1, 1922, at which time the index stood at 169.70. The September volume index (225) is 20.3 per cent greater than that of August and falls but 3.0 per cent under the volume for Sept., 1930.



E. N.-R. Cost		E. N.-R. Volume	
Oct., 1931	**169.78**	**Sept., 1931**	**225**
Sept., 1931	171.40	Aug., 1931	187
Oct., 1930	198.72	Sept., 1930	242
1930 (Average)	202.85	1930 (Average)	260
1929 (Average)	207.02	1929 (Average)	317
1913 average	100.00		
1930		1930	
January	208.96	January	199
February	206.46	February	204
March	206.80	March	408
April	207.12	April	320
May	205.86	May	354
June	203.36	June	324
July	200.95	July	226
August	200.95	August	259
September	199.58	September	232
October	198.72	October	211
November	198.54	November	207
December	196.86	December	192
1931		1931	
January	194.48	January	208
February	196.61	February	198
March	194.51	March	278
April	191.63	April	289
May	189.33	May	251
June	187.23	June	243
July	174.37	July	248
August	171.38	August	187
September	171.40	September	225
October	169.78		

Current Prices of Construction Materials

Price advances since last month are indicated by **heavy type**; declines by *italics*

Building Materials

PORTLAND CEMENT—Prices per barrel, for cement in cloth, *without including charge for four bags at 10c. each*. Cash discount not deducted. Prices are delivered by truck to contractors at site of job:

	Oct. 1, 1931	One Mo. Ago	One Yr. Ago
Atlanta	$2.15	$2.15	$3.00
Baltimore	**1.95**	1.82	2.60
Birmingham	2.40	2.25	2.60
Boston	2.20	2.20	2.40
Chicago	1.95	1.95	2.20
Cincinnati	1.60	1.60	2.94
Cleveland	1.25	1.25	2.80
Dallas	1.88	1.88	2.15
Denver	2.40	2.40	2.61
Detroit	2.08	2.08	2.60
Jersey City	*1.79*	1.89	2.60
Kansas City	2.10	2.10	2.60
Los Angeles	**2.50**	2.10	1.92
Minneapolis	2.15	2.15	2.50
Montreal	2.18	2.18	2.20
New Orleans	1.95	1.95	2.65
New York	*1.60*	1.85	2.10
Philadelphia	1.95	1.95	2.10
Pittsburgh	1.81	1.81	....
St. Louis	1.85	1.85	1.95
San Francisco	2.44	2.44	2.64
Seattle	2.20	2.20	2.25

Current mill-prices per barrel to dealers, in carloads, without including charge for four cloth bags, f.o.b.:

Alpena, Mich	$1.20	Limedale, Ind	$1.10
Buffington, Ind	1.10	Mason City, Ia	1.10
Dallas, Tex	1.74	Norfolk, Va	1.61
Hannibal, Mo	1.10	Northampton, Pa	1.21
Hudson, N. Y	1.21	North Birmingham, Ala	1.31
Ironton, Ohio	1.06	Richard City, Tenn	1.31
Iola, Kan	1.10	Universal, Pa	1.21
La Salle, Ill	1.10	Wyandotte, Mich	1.20

SAND AND GRAVEL—Per ton, delivered by dealers. Gravel, sizes ¼-in. or 1½-in.:

	Gravel	Sand
Atlanta	$3.00	$2.00
Baltimore	*2.35@2.55*	**2.03**
Birmingham, per cu.yd., 2,600@2,800 lb	2.90	2.50
Boston	1.60@1.75	.90@1.15
Chicago, per cu.yd., 3,000 lb	*1.60@1.65*	*1.60*
Cincinnati	1.50	1.25
Cleveland, per cu.yd., 3,000 lb	2.60	2.50
Dallas, per cu.yd., 2,750 lb	2.25	2.25
Denver, per cu.yd., 2,700 lb	1.80	1.35
Detroit	1.65	1.50
Kansas City	2.00	2.00
Los Angeles	2.20	1.50@1.70
Minneapolis, per cu.yd., 2,800 lb	1.70@2.40	1.00
Montreal	1.50	1.25
New Orleans, per cu.yd., 2,700 lb	2.95	1.80
New York, per cu.yd., 2,800@3,000 lb	3.15	2.15
Philadelphia	2.35@3.20	1.55@2.40
Pittsburgh	1.55	1.75
St. Louis	1.65	1.35
San Francisco	1.75	1.75
Seattle, per cu.yd., 3,200 lb	1.85	1.85

CRUSHED STONE—Per ton, sizes ¾-in. or 1½-in., limestone, delivered by dealers:

Atlanta	$3.00
Baltimore	*2.60@2.80*
Birmingham	*Slag used*
Boston	1.90@2.00
Chicago, per cu.yd., 2,500 lb	*1.60@1.65*
Cincinnati	2.25
Cleveland	2.60
Dallas, per cu.yd., 2,500 lb	*2.90@3.00*
Denver, granite, per cu.yd., 2,700 lb	2.50
Detroit	1.95
Kansas City	2.00
Los Angeles	2.20
Minneapolis, per cu.yd., 2,600 lb	2.40
Montreal	2.00
New York, per cu.yd., 2,800@3000 lb	3.15
Philadelphia	2.30@3.15
Pittsburgh	3.25
St. Louis	1.65
San Francisco, trap rock	1.65
Seattle, per cu.yd., 2,700 lb	3.00

CRUSHED SLAG—Prices for carloads, per net ton, at plant:

	1½-In.	¾-In.	Roofing	Sand
Birmingham, Ala	$0.90	$1.15	$2.05	$0.55
Buffalo District	1.25	1.35	2.25	1.25
Cleveland, Ohio	1.10	1.10	2.25	.70
Western Pennsylvania	1.25	1.25	2.00	1.25
Toledo, Ohio	1.10	1.10	1.10	1.00
Youngstown District	1.25	1.35	2.00	1.25

CONCRETE BLOCKS—Standard, 8x8x16-in., hollow, delivered to job, each:

Birmingham (5x8x12)	$0.084	Kansas City	$0.18
Boston	.16@.20	Minneapolis	.11
Brooklyn and Queens	.12	New Orleans	.20
Cleveland	.16@.17	Philadelphia	.18@.25
Denver	.22	Pittsburgh	.20@.26
Detroit	.12	St. Louis	.14

HOLLOW TILE—Building tile per block, delivered by dealers to contractor in lots of 2,000 pieces or over:

	4x12x12	6x12x12	8x12x12	10x12x12	12x12x1
Atlanta	$0.09	$0.12	$0.14	$0.18	$0.24
Baltimore	.105	.....	.20	.....	.26
Birmingham	.089	.122	.167	.219	.25
Boston	.082	.118	.152	.21	.33
Chicago	.068	.0935	.1275	.1647	.183
Cincinnati	.06815	.09485	.129	.165	.184
Cleveland	.048	.066	.09	.117	.13
Dallas	*.041*	*.107*	*.147*	.....	*.284*
Denver	.0975	.135	.175	.2125	.25
Detroit	.08	.11	.145	.19	.215
Kansas City	.088	.11	.145	.19	.215
Los Angeles	.09425	.134	.188	.2325	.311
Minneapolis	.0611	.081	.10605	.1302	.1737
New Orleans	.068	.093	.13	.176	.212
New York	.075	.125	.14	.....	.....
Perth Amboy, N. J. (f.o.b.)	.....	.....	.....	.2388	.2956
Philadelphia	.105	.14	.215	.28	.34
Pittsburgh	.041	.058	.0845	.111	.1227
St. Louis	.07	.098	.125	.17	.20
San Francisco	.0765	.105	.1765	.....	.....
Seattle	.085	.115	.18	.....	.....

BRICK—Prices delivered by dealers per thousand, are as follows:

			—Paving F.O.B.—	
	Common	Face	3x8¼x4-In	3¼x8¼x4-In.
Atlanta	$13.00	$21.50	$32.00	$37.00
Baltimore	12.50	25.00@35.00	40.00	43.00
Birmingham	13.50	22.50	27.00	32.00
Boston	14.00	28.00	42.50	47.00
Chicago	12.00	.....	42.00	*45.00*
Cincinnati	16.00	24.00	35.00	37.00
Cleveland	12.00@14.00	21.00@28.00	33.00	36.00
Dallas	*13.00*	17.50	.....	35.00
Denver	9.00@10.00	25.00	.....	.....
Detroit	**15.50**	25.00	35.50	37.50
Kansas City	14.00	.....	35.00	37.50
Los Angeles	9.00	26.50	.....	.....
Minneapolis	10.50	30.00	.....	.....
Montreal	28.00	.....	.....	.....
New Orleans	13.00	.....	35.00	42.00
New York	*11.50*	26.00	45.00	50.00
Philadelphia	16.00	.....	40.00	45.00
Pittsburgh	12.00	22.00	41.00	58.00
St. Louis	14.00	22.00	35.00	35.00
San Francisco	14.00	.....	45.00*	.....
Seattle	14.00	.....	48.50	61.00

*2¼x8¼x4-in.

LIME—Prices delivered by dealers to job:

	—Hydrated, per Ton—		—Lump, per Barrel—	
	Finishing	Common	Finishing	Common
Atlanta	$20.00	$12.50	.....	$2.50†
Baltimore	22.00	14.00	.....	2.25†
Birmingham	30.00	17.50	.....	*2.00†*
Boston	22.00	14.50	$4.00*	3.10*
Chicago	15.00	**15.00**	2.75†	1.50†
Cincinnati	13.05	10.70	.....	.....
Cleveland	12.00	10.00	2.50†	2.50†
Dallas	20.00	.....	2.35†	.....
Denver	30.00	23.75	3.80*	3.00†
Detroit	14.00	12.00	1.75†	1.65*
Kansas City	19.00	18.00	2.25†	2.00†
Los Angeles	26.00	18.00	2.00†	2.00†
Minneapolis	25.50	21.00	.....	1.70†
Montreal	18.00	.....	10.00	.....
New Orleans	25.00	15.00	2.65†	1.95†
New York	*17.00*	*14.00*	4.10*	3.15*
Philadelphia	18.00	14.50	18.00‡	14.00‡
Pittsburgh	13.50	13.00	4.25*	2.75†
St. Louis	22.00	18.00	.....	15.00‡
San Francisco	20.00	20.00	.....	1.85†
Seattle, paper sacks	35.00	24.00	.....	2.80†

*Per 280-lb. bbl. (net). †Per 180-lb. (net). ‡Per ton.

LIMESTONE—Mill blocks, f.o.b. siding, per cu.ft.:
New York: Rustic buff, $1.42; Standard gray, $1.47; Standard, $1.57; Selected gray, $1.57; Selected buff, $1.67.
Boston: Rustic buff, $1.45; Standard, $1.58; Selected buff, $1.71.
Pittsburgh: Rustic buff, $1.03; Standard, $1.18; Selected buff, $1.28.

SLATE—Roofing, f.o.b. quarry, Bangor, Pa., net, per square;

No. 1 Clear	$9.00@$14.00
No. 1 Ribbon	7.50@ 10.25
Medium Clear	8.00@ 10.50

Road and Paving Materials

PAVING STONE—Carload lots of granite blocks, 4x8x4-in., dressed, f.o.b.:

Atlanta	$3.00 per sq.yd.
Baltimore	3.00 per sq.yd.
Boston	135.00 per M.
Chicago, 5 in	3.25@3.90 per sq.yd.
Cincinnati	110.00 per M.
Cleveland	90.00@100.00 per M.
Detroit, 5 in	3.00 per sq.yd.
Kansas City	3.75 per sq.yd.
Minneapolis, 4½ in	2.80 per sq.yd.
Montreal	104.75 per M.
New Orleans	2.80 per sq.yd.
New York, 5 in	120.00 per M.
Philadelphia	125.00 per M.
St. Louis, 5 in	3.30per sq.yd

Current Prices of Construction Materials

Road and Paving Materials—Continued

WOOD-BLOCK PAVING—Prices, f.o.b., in carloads:

	Size of Block	Treatment	Per Sq.Yd.
Atlanta	3½	16	$2.25
Boston	3½	16	2.25
Chicago	3½	12	1.80@2.00
Kansas City	3½	16	2.50
Minneapolis	3¼	16	2.50
Montreal	3	16	2.63
New Orleans	3½	16	2.30
New York	3½	16	2.00
St. Louis	3½	16	2.10

FLAGGING—Alongside dock, New York, per sq.ft.: Manhattan and Bronx, 4 ft. wide....$0.24 Queens, 5 ft. wide.....$0.26

CURBING—Prices per lin.ft., f.o.b., cutting charges not included:
New York: Bluestone, f.o.b. barge, straight, 5x16-in., rough, 90c.
Birmingham: Granite, straight, 5x16-in., 50c.; 6x20-in., 60c.; roundings, 5x16-in., 65c.; 6x20-in., 80c.
St. Louis: Class "B" straight, 5x16-in., 75c.; roundings, $1.05@$1.30.

ASPHALT—Paving asphalt, f.o.b., per ton. Packages are 350-lb. bbls. or 425-lb. drums, in carload lots:

	Packages	Tank-car or -boat
Atlanta	$18.40	$15.40
Baltimore (f.o.b. refinery)	16.00	12.00
Birmingham (f.o.b. refinery)	.....	16.50
Boston	22.00	17.50
Chicago	22.50	18.30
Cincinnati	.....	12.00
Cleveland	18.75	15.50
Dallas	*19.50*	.....
Denver	30.00	.....
Detroit	16.68	12.43
Kansas City (f.o.b. refinery)	16.00	11.00
Los Angeles (f.o.b. refinery)	18.00	12.00
Maurer, N. J. (Bermudez)	.....	25.00
Maurer, N. J. (Trinidad)	.....	21.00
Minneapolis (f.o.b. Twin Cities)	23.10	18.10
Montreal	17.00	13.00
New Orleans	24.00	21.00
New York (f.o.b. refinery)	16.00	12.00
Philadelphia	16.00	12.00
Pittsburgh	24@26	14@18
St. Louis	*19.50*	*15.50*
San Francisco (f.o.b. refinery)	18.00	12.00
Seattle	21.40	18.00

ROAD OILS—Residual, prices f.o.b., in tank cars, 8,000 gal. minimum, 45% asphalt, per gal:

New York	$0.035
Birmingham	.06
St. Louis	.04
Dallas	.05

Iron and Steel

PIG IRON—Furnace, per gross ton:

Birmingham, No. 2 fdry., silicon, 1.75@2.25	$12.00
Pittsburgh, basic	16.00

STRUCTURAL STEEL—Prices per 100 lb., delivered from warehouse except in Birmingham and Pittsburgh, where prices are f.o.b. mill, beams and channels, 3 to 15 in; angles 3 to 6-in., ¼-in. thick; tees, 3-in. and larger; and plates, ¼-in. thick and heavier:

Birmingham	$1.70	New York	$2.35
Chicago	3.00	Pittsburgh	1.60
Cleveland	2.95	St. Louis	3.25
Dallas	*3.50*	San Francisco	2.90

BARS, CONCRETE REINFORCING—Prices per 100 lb., delivered from warehouse except in Birmingham and Pittsburgh, where prices are f.o.b. mill, on bars rolled from billets, size ½-in.:

Birmingham	$1.75	New York	$2.35
Chicago	2.00	Pittsburgh	1.60
Cleveland	1.75	St. Louis	3.15
Dallas	2.75	San Francisco	2.50

EXPANDED METAL LATH—Per 100 sq.yd., painted, delivered to job:

Lb. per Sq.Yd.	New York	Birmingham	Chicago	St. Louis	Dallas	San Francisco
2.2	$13.00	$17.50	$10.60	$19.00	$18.00	$21.50
2.5	14.00	18.50	11.40	20.00	19.50	22.50
3.0	15.50	20.50	12.65	21.50		25.00
3.4	16.50	22.00	13.60	22.50	24.00	27.00

WIRE REINFORCEMENT FOR CONCRETE—Plain, per 100 sq.ft., 4 in. x 4 in. triangle mesh. Manufacturers' quotations are in carloads at mills; dealers' are delivered in lots of 10,000 sq.ft. or over:

Style Number	Weight in Pounds per 100 sq.ft.	Pittsburgh Mill	Chicago District Mill	Del. From Warehouse—New York	St. Louis	Dallas	San Francisco
032	22	$0.94	$0.87	$1.32	$1.30	$1.63	$1.22*
049	28	1.20	1.11	1.67	1.70	2.00	1.55*
068	30	1.47	1.35	2.07	2.10	2.25	1.91*
093	45	1.88	1.74	2.65	2.65	2.86	2.46*
126	57	2.33	2.15	3.28	3.30	3.52	3.03*
153	68	2.78	2.56	3.92	3.95	4.20	.....
180	78	3.19	2.95	4.49	4.35	4.80	.....

*F.o.b.

STEEL SHEETS—Prices per 100 lb. for base sizes, delivered from warehouse, except in Pittsburgh, where prices are f.o.b. mill:

	Blue Annealed No. 10*	Black No. 24	Galvanized No. 24
Chicago	$3.20	$3.55	$4.10
Cleveland	3.00	3.60	4.00
New York	2.65	3.50	4.00
Pittsburgh	1.85	2.15@2.25	2.75@2.80
St. Louis	3.45	*3.80*	4.35
San Francisco	3.65	4.15	4.65

*Light plates.

WIRE ROPE—Discounts from manufacturers' list price on regular grades of bright and galvanized, Eastern Territory, New York, and East of Missouri River:

	Base
Cast steel round strand rope	20%
Galvanized iron rigging and guy rope (add to list)	12½%
Galvanized steel rigging and guy rope	7½%
Plow steel round strand rope	35%
Round strand iron and iron tiller	50%
"Special Steel" and extra strong cast steel, round strand rope	27½%

Discount 5 points less than discount for Eastern territory: California, Oregon, Nevada, Washington, Wyoming, New Mexico, Colorado, North Dakota, Nebraska, Kansas, Oklahoma and Texas. Discount 10 points less than discount for Eastern territory: Arizona, Montana, Idaho and Utah.

RIVETS—Structural rivets, round head, ½-in., full kegs, per 100 lb., delivered from warehouse, except in Pittsburgh, where prices are f.o.b. mill:

Chicago	$4.75
Dallas	5.00
Denver	4.65
New York	4.00
Pittsburgh	2.75
St. Louis	4.15
San Francisco	5.50
Seattle	4.50

STEEL SHEETPILING—Base price, f.o.b., Pittsburgh, for large mill lots, per 100 lb.....$1.90

TERNE PLATE—I C, 8-lb. coating, 20x28-in., f.o.b., Pittsburgh mill: Per package.....$10.30

SHIP SPIKES—Per 100 lb., black, from dealers' warehouse stocks; galvanized are about $1.75 per 100 lb. higher:

	½-In.	⅝-In.	¾-In.
San Francisco	$5.50	$5.05	$4.90
Seattle	7.75	5.65	5.50

Pittsburgh mill base in lots of 200 kegs or more, $2.90 per 100 lb.

WIRE NAILS—Per 100 lb. keg, base, delivered from warehouse stocks; also Pittsburgh mill base:

Pittsburgh Mill	Birmingham	Chicago	St. Louis	Dallas	San Francisco	Montreal
$1.95@$2.00	$2.65	$3.30	$2.40	$3.50	$2.75	$4.95

SCRAP—The prices following are, f.o.b., per ton, paid by dealers:

	New York Per Gross Ton	Chicago Per Gross Ton	Detroit Per Gross Ton
No. 1 railroad wrought	$8.25	$8.00@$8.50	
Stove plate	4.00@4.75	7.50@ 8.00	$3.00@$4.25
No. 1 machinery cast	*7.00*	10.50@ 11.00	*8.00@ 8.50**
Machine shop turnings	*2.00*	3.75@ 4.25	4.00
Cast borings	2.50	3.75@ 4.25	5.50
Railroad malleable	6.50	9.50@ 10.00	
Re-rolling rails	6.25	10.50@ 11.00	*8.50@ 9.00*
Misc. steel rails	.....	8.50@ 9.00	*8.50*
Heavy melting steel, No. 1	5.00	8.50@ 9.00	7.00
Iron and steel pipe	*5.50*	3.50@ 4.00	.....

*Net ton.

FREIGHT RATES—The following freight rates per 100 lb., effective May 20, 1930, apply on finished steel products in the Pittsburgh district, including plates, structural shapes, merchant-steel bars, pipe fittings, plain and galvanized wire nails, rivets, spikes, bolts, flat sheets (except planished), chains, etc.:

Atlanta	$0.58*	Detroit	$0.265†
Baltimore	.27†	Kansas City	.615†
Birmingham	.58*	New Orleans	.67*
Boston	.40†	New York	.33†
Buffalo	.235†	Pacific Coast (all rail)	1.15‡
Chicago	.34†	Philadelphia	.29†
Cincinnati	.265†	St. Louis	.39†
Cleveland	.185†	St. Paul	.50*
Denver	1.15‡		

*36,000 lb. †40,000 lb. ‡60,000 lb.

Railway Materials and Supplies

STEEL RAILS—Per gross ton, f.o.b.:

	Pittsburgh	Birmingham	Chicago
Standard openhearth rails	$43.00	$43.00	$43.00
Light rails, 25 to 45 lb.	34.00	33.00	34.00
Re-rolled rails	24.00@28.00	.....	*32.00*

RAILWAY TIES—For fair-sized orders, f.o.b., the following prices per tie hold:

		6 In. x 8 In. by 8 Ft.	7 In. x 9 In. by 8½ Ft.
New York	Long-leaf sap pine, untreated	$1.00	.....
	Creosoted—prices on application		
Birmingham	White oak, untreated	.95	1.10
	White oak, creosoted	1.50	1.60
	Southern pine, untreated	.50	1.00
	Southern pine, creosoted	1.10	1.45
Chicago	White oak, untreated	*1.05*	*1.20*
	Oak, empty cell, creosoted	*1.60*	*1.75*
	Oak, zinc treated	1.49	2.19
	Southern pine, creosoted	1.38	1.94
St. Louis	White oak, untreated	.85	1.40
	Red oak, untreated	.80	*1.45*
	Red oak, creosoted	1.15	*1.85*
	Sap pine or cypress, untreated	.70	1.45
San Francisco	Douglas fir, green, untreated	.51	.73
	Douglas fir, empty cell, creosoted	1.40	1.79
Montreal	Birch or maple, untreated	.75@1.25	.75@1.25
	Birch or maple, creosoted	1.20@1.30	1.50@1.60

Current Prices of Construction Materials

Railway Supplies—Continued

TRACK SUPPLIES—Prices per 100 lb., f.o.b. for large mill lots at Pittsburgh and Birmingham, together with warehouse prices at other places named:

	Pittsburgh	Birmingham	Chicago	St. Louis	San Francisco
Standard spikes, ⅝-in. and larger	$2.70	$2.70	$3.45	$3.65	$4.10
Track bolts	3.80	3.70	4.30	4.50	5.10
Standard section angle bars, splice bars or fish plates	2.75	3.00*	5.75	.....	.....
Tie plates	1.95	2.07½	1.95†	.....	.....

*At warehouse. †At mill.

Pipe

WROUGHT STEEL PIPE—Discounts from standard lists for delivery from warehouse, except at Pittsburgh, where prices are f.o.b. mill:

	1 to 3-In. Butt Weld		3½ to 6-In. Lap Weld	
	Black	Galvanized	Black	Galvanized
Chicago	57.3%	44.8%	53.9%	41.4%
Cleveland	53.3%	42.3%	50.8%	37.8%
New York	56.14%	43.6%	52.72%	40.18%
Pittsburgh	64%	52.5%	61%	49.5%
St. Louis	51%	38%	48%	35%

CAST-IRON PIPE—Prices per net ton, for bell and spigot pipe, Class B and heavier, f.o.b., on regular lots (250 tons and under) of pipe:

	4-In.	6-In. and Over
Birmingham mill	$38.00@$39.00	$35.00@$36.00
Burlington (N. J.) mill	36.00@ 37.00	33.00@ 34.00
Chicago	46.00@ 47.00	43.00@ 44.00
New York	39.00	36.00
Pittsburgh	46.50@ 47.50	43.50@ 44.50
St. Louis	45.80	42.80
San Francisco	48.00@ 49.00	45.00@ 46.00

Gas pipe and Class A, $3.00 per ton extra.

SEWER PIPE—Prices delivered, per foot, for standard pipe; 6, 8 and 12-in. are single strength and 18, 24, 30 and 36-in. are double strength:

	6-In.	8-In.	12-In.	18-In.	24-In.	30-In.	36-In.
Atlanta	$0.105	$0.175	$0.315	.....	.....	.....	.....
Baltimore	.10	.30	.58	.....	$1.93	.....	$6.50
Birmingham	.135	.225	.405	$0.85	1.625	$3.18	4.38
Boston	.18	.28	.55	1.35	2.38	3.95	5.90
Chicago	.18	.28	.54	1.25	2.25	4.75	6.00
Cincinnati	.135	.21	.405	1.05	1.89	3.46	5.4325
Cleveland	.1125	.175	.3375	.825	1.485	4.824	7.38
Dallas	.23	.325	.586	1.106	1.95	3.68	5.00
Denver	.161	.23	.414	.816	1.44	.....	.....
Detroit	.18	.28	.6075	1.50	2.70	5.12	.....
Kansas City	.21	.33	.52	1.22	1.90	3.60	.....
Los Angeles	.217	.2825	.4985	1.1865	2.034	3.93	9.00
Minneapolis	.155	.24	.50	1.15	1.85	3.45	4.60
Montreal	.90	.45	.75	1.95	2.60	.....	7.20
New Orleans	.18	.30	.54	1.02	1.95	.....	.....
New York	.17	.265	.52	1.30	2.34	4.47	6.86
Philadelphia	.0945	.147	.297	.80	1.44	2.304	3.28
Pittsburgh	.1575	.245	.54	1.25	2.25	4.68	7.17
St. Louis	.1295	.235	.423	1.05	1.80	3.20	4.40
San Francisco	.21	.30	.54	1.26	2.16	3.60	5.40
Seattle	.22	.30	.54	1.26	2.16	2.50	5.50

CLAY DRAIN TILE—Prices delivered by dealers, per 1,000 lin.-ft.:

Size, In.	New York	Birm'ham	Pittsburgh	Chicago	St. Louis	San Fran.	Seattle
4	$43.00*	$50.00	$80.00	$60.00	$50.00	$67.50	$60.00
6	78.00*	85.00	110.00	100.00	85.00	112.50	112.00

*F.o.b.

Miscellaneous

LINSEED OIL—Raw oil, f.o.b., in 1- to 4-bbl. lots, per lb.:
New York..... *$0.08* Chicago..... *$0.091* Minneapolis... *$0.091*

WHITE AND RED LEAD—Base price per 100-lb. keg, f.o.b., New York: White, dry, $13.25; White in oil, $13.25; Red, dry, $13.25; Red, in oil, $14.75.

CHEMICALS—Water, sewage treatment, road work, round lots in the New York market:

Sulphate of aluminum, in bags, per 100 lb	$1.25@$1.40
Sulphate of copper, in bbl., per 100 lb	3.60@ 3.75
Soda ash, 58%, in bags, per 100 lb	1.15@1.17½
Chlorine, cylinders, per lb	.04@ .06
Bleaching powder, in drums, f.o.b. works, per 100 lb	2.00@ 2.10
Calcium chloride, flaked, in drums, f.o.b. works, per ton	22.75

MANILA ROPE—The number of feet per pound for the various sizes is as follows: 5-in., 7-ft., 6-in.; ¾-in., 6-ft., 1-in.; ½-in., 4-ft., 5-in.; 1-in., 3-ft., 8-in.; 1¼-in., 2-ft., 5-in.; 1½-in., 1-ft., 8-in. Following prices are quoted by dealers per pound for ¾-in. and larger:

Atlanta	$0.26	Kansas City	$0.23
Baltimore	.225	Los Angeles	.175
Birmingham	.25	Minneapolis	.19
Boston	.20	Montreal	.185
Chicago	.16	New Orleans	.22
Cincinnati	.21	New York	.17
Cleveland	.21	Philadelphia	.21
Dallas	.285	St. Louis	.17@.175
Denver	.20	San Francisco	.175
Detroit	.185	Seattle	.175

BUILDING PAPER—Black, 50-lb. per roll of 500 sq.ft., in carloads, f.o.b., producing point..... $2.16

SLATERS FELT—In carloads, per roll, f.o.b., producing point..... $0.79

ROOFING MATERIALS—Prices, f.o.b. New York, delivered by dealers to contractors, in carloads:

Asphalt felt, per 100 lb	$2.50
Tar felt, per 100 lb	2.50
Asphalt coating, per gal	.34½
Tar pitch, in 350 lb. barrels, per ton	28.00

PREPARED ROOFINGS—Prices, delivered by dealers to contractors, in carloads, f.o.b. New York, per square:

Single shingles, slate finish, sufficient to cover 100 sq.ft.	$6
Strip shingles, 4 in 1, hexagonal shape, with Underwriters' label	6
Slate surfaced roofing in rolls weighing 85 to 90 lbs.	2

WINDOW GLASS—Discounts from latest jobbers' window-glass list, dated Sept. 15, 1928, at New York warehouse:

	Single Thickness		Double Thickness	
	A Quality	B Quality	A Quality	B Quality
First 3 brackets	89%	91%	88%	90%
Larger sizes	88%	90%	88%	90%

EXPLOSIVES—Price per pound for dynamite delivered in small lots—under 200 lb.:

	Gelatin 40%	Gelatin 60%		Gelatin 40%	Gelatin 60%
Atlanta	$0.22	$0.245	Los Angeles†	$0.1725	$0.1925
Baltimore	.215	.2375	Minneapolis	.20	.225
Birmingham	.135	.157	Montreal	.20	.24
Boston	.225	.25	New Orleans	.195	.22
Chicago	.21*	.2325*	New York	.245‡	.2675
Cincinnati	.22	.245	Philadelphia	.215	.24
Dallas	**.234**	**.272**	St. Louis	.1975	.2175
Denver, f.o.b.	.19	.2125	San Francisco	.155	.18
Kansas City, Mo.	.2025	.2225	Seattle	.1525	.175

*Quantities under 500 lb. †San Fernando Arsenal. ‡Special gelatin in case lots.

Lumber

Prices Are Per Thousand Feet, Board Measure

New York—Timbers, No. 1 Common, rough, delivered to contractor at site of job, in Manhattan, in 20 ft. lengths and under, per M. ft., b.m.:

	Long-leaf Yellow Pine	Douglas Fir
3x4 to 8x8	$47.50	$30.00
3x10 to 10x10	55.00	31.50
3x12 to 12x12	65.00	32.50
3x14 to 14x14	72.50	35.50

Chicago—Timbers, No. 1 Common, rough, per M. ft. b.m., f.o.b., in carloads. For delivery to job from stock, in truckloads, add $10 per M. ft., b.m.:

	20 Ft. and Under Long-Leaf Yellow Pine	Up to 32 Ft. Douglas Fir
3x4 to 8x8	$39.50	$37.50
3x10 to 10x10	47.00	37.50
3x12 to 12x12	58.00	37.50
3x14 to 14x14	71.00	38.50

San Francisco—Douglas fir, No. 1 Common, rough, at yards. For delivery to contractor at site of job, add $5 per M. ft., b.m.:

	10-16-18 and 20 Ft.	22 and 24 Ft.
3x3 and 4	$30.00	$32.00
3x6 and 8	30.00	32.00
3x10 and 12	30.00	32.00
3x14	33.00	34.00

Other Cities—Delivered by dealers, No. 1 Common, rough, per M. ft., b.m.:

	8x8-In. x 20 Ft. and Under				3x12 to 12x12-In. 20 Ft. and Under	
	Pine	Fir	Hemlock	Spruce	Pine	Fir
Atlanta	$50.00	.....	.....	.....	$65.00	.....
Baltimore	36.00	$50.00	$53.50	$61.75	75.00	$50.25
Birmingham	46.00	.....	.....	.....	76.00	.....
Boston	51.00	46.00	47.00	48.75	57.00	43.00
Cincinnati	42.50	55.00	.....	.....	52.50	52.50
Cleveland	54.00	54.00	.....	.....	45.00	49.00
Dallas	55.00	*55.00*	55.00	55.00	55.00	50.00
Denver	.....	34@50	50.00	.....	.....	49.00
Detroit	53.00	51.00	.....	.....	65.00	51.00
Kansas City	36.00	36.50	36.50	.....	55.00	42.00
Los Angeles	.....	41.50	.....	.....	.....	42.50
Minneapolis	.....	46.25	.....	.....	.....	46.25@47.75
Montreal	.....	.....	.....	40.00	40.00	.....
New Orleans	40.00	40.00	.....	45.00	65.00	60.00
Philadelphia	45.00	42.00	36.00	40.00	55.00	40.00
Pittsburgh	53.00	57.00	65.00	66.00	43@57	57@60
St. Louis	*43.00*	38.00	39.00	.....	*55.00*	39.00
Seattle	.....	16.00	.....	.....	.....	15.00

	1x10 In. x 16 Ft. and Under			2x10 In. x 16 Ft. T. & Gr.	
	Pine	Fir	Hemlock	Pine	Fir
Atlanta	$55.00	.....	.....	$37.50	.....
Baltimore	53.00	$44.00	$43.75	.....	.....
Birmingham	40.00	.....	.....	55.00	.....
Boston	46.00	41.00	42.00	48.00	$45.00
Cincinnati	45.00	47.50	.....	35.00	45.00
Cleveland	65.00	54.00	.....	42.00	54.00
Dallas	60.00	.....	.....	55.00	.....
Denver	.....	26.00	36.00	.....	45.00
Detroit	49.00	45.00	.....	46.00	45.00
Kansas City	45.00	35.00	35.00	35.00	33.00
Los Angeles	41.50	41.50	.....	.....	48.50
Minneapolis	65.00*	40.00	.....	45.00*	39.00
Montreal	45.00	50.00	40.00	.....	55.00
New Orleans	40.00	40.00	.....	54.00	58.00
Philadelphia	48.00	40.00	35.00	49.00	40.00
Pittsburgh	40.00	47.00	55.00	40.00	50.00
St. Louis	*38.50*	39.00	39.00	*41.00*	*50.00*
Seattle	.....	15.00	.....	.....	16.00

*Northern Pine, No. 2 Com.

PILES—Prices of Nichols Bros., 90 West St., N.Y.C., per lineal foot, pine, with bark on, f.o.b., New York; delivered from barge, 1½ to 2c. per ft. additional:

Dimensions	Points	Length	Barge	Rail
12 in. at butt	6 in.	30 to 50 ft.	$0.12	$0.165
12 in.—2 ft. from butt	6 in.	50 to 59 ft.	.165	.215
12 in.—2 ft. from butt	6 in.	60 to 69 ft.	.19	.235
14 in.—2 ft. from butt	6 in.	50 to 69 ft.	.225	.345
14 in.—2 ft. from butt	6 in.	70 to 79 ft.	.2425	.295
14 in.—2 ft. from butt	5 in.	80 to 85 ft.	.305	.395
14 in.—2 ft. from butt	5 in.	85 to 89 ft	.345	.435

CONSTRUCTION NEWS

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Some of the Week's Large Projects

For further details turn to the appropriate sections in this issue

Location	Project	Cost	Status
Waterworks			
Ft. Wayne (Ind.)	Filtration plant	$1,000,000	Bids asked
Sewers			
Columbus (Ohio)	Sewage disposal plant	4,000,000	Proposed
Cleveland	Sewage disposal plant	8,000,000	Bids asked
Bridges			
New Orleans	Bridge	19,000,000	Contract
Federal Government			
Washington (D. C.)	Warehouse	1,015,000	Contracts
Pennsylvania	Dam	6,000,000	Proposed
Railways			
Colorado	New line	3,500,000	Bids asked
Grade Crossings			
Atlantic City	Eliminating grade crossings	1,000,000	Proposed
Elizabeth (N. J.)	Eliminating grade crossings	1,000,000	Proposed
Piers and Wharves			
Gulfport (Miss.)	Developing piers, wharves, slips, etc	1,000,000	Proposed
Power and Lighting			
Missouri	Transmission line	1,000,000	Contract
Parks and Sports			
Brooklyn	Park	40,000,000	Proposed
Factories and Mills			
St. Louis	Publishing plant	1,500,000	Contract
Power Plants			
Cleveland	Extending and enlarging electric light plant	2,500,000	Proposed
Warehouses			
New York	Inland freight terminal	7,591,000	Contract
Buildings			
Grand Rapids (Mich.)	Civic auditorium	1,000,000	Proposed
Willimantic (Conn.)	Home	1,500,000	Proposed
Boston	Memorial building	1,000,000	Proposed
Lakewood (N. J.)	Motion picture studio	1,000,000	Proposed
Jersey City	Hospital	5,000,000	Proposed
Pine Aire, Station (N. Y.)	Hospital	2,110,527	Contract
Philadelphia	Hospital	1,064,200	Contract
Washington (D. C.)	Office	3,000,000	Proposed
Buildings			
New York	Residential	2,300,000	Separate contracts
Brooklyn	School	3,000,000	Proposed
Long Island City	School	3,000,000	Proposed
New York	School	3,000,000	Proposed
Milwaukee	School	1,125,000	Proposed

WATERWORKS

PROPOSED WORK

Calif., Long Beach—City Council soon takes bids 17,215 ft. 24- to 42-in. centrifugal cast rein.-con. pipe, 2½, 2¾ and 3½ in. wall thickness.

Ind., Hammond—New filtration plant, $1,600,000. C. O Schonert, mayor.

Ind., Paoli—City Council issued $15,000 bonds, new filtration plant. Noted May 7.

Ind., Seelyville—Seelyville Water Co. waterworks, $20,000. Address City Clerk.

Mont., Hot Springs—Rejected bids Aug. 31, waterworks, incl. 16,207 lin.ft. 6 and 8 in. c.i. pipe, 27 gate valves, 75,000 gal. steel or wood tank, 1 pump house, 1 centrifugal pump, 1 deep well, $30,000. Will readvertise. A. L. Jaqueth, Kalispell, engr. Noted Sept. 18.

Pa., Cresson—Cresson State Sanitary Dist., gas main, water lines, boilers, stoker. C. A. Blatchley, Drexel Bldg., Phila., engr.

Utah, St. George—City Council constructing 18 in. cement flow line from city water source to reservoir, $25,000. W. W. Cannon, city engr.

Utah, Salt Lake City—Utah State National Guard, c/o W. G. Williams, Utah Natl. Guard, preliminary plans, water supply for Camp W. G. Williams, incl. pumping plant, water supply from wells along Jordan River, $35,000.

Ont., Oshawa—Extending waterworks filtration plant, also concrete, steel filtration equipment, $85,000. F. B. Goedike, City Offices, engr.

Ont., Ottawa—Council, 12 in. watermain extension Primrose Ave. between Bronson and Empress Ave., Empress Ave. between Bronson Ave. and Somerset St., $11,700; 6 in. watermain extension in Baldwin St. from Wellington St. to point 650 ft. easterly $2,900; in Pinard St. to connect with existing supply to Hopewell Hospital, $3,400. F. C. Askwith, City Hall, engr.

Ont., Pembroke—Filtration plant, $100,000. A. Biggs, mayor.

Ont., Simcoe—Council, R. G. Berry, mayor, chn. com., extending mains in Queen and Robinson Sts. $25,000. G. R. Marston, town engr.

Ont., Toronto—For ½ mi. c.i. main in Keele St. from Dundas St. to Humberside Ave. $72,600. R. C. Harris, City Hall, engr.

Ont., Toronto—York Twp. 6 in. diam. and up c.i. watermains, valves, hydrants, $50,000-$100,000. T. S. Scott, 40 Jarvis St., engr.

Ont., Willowdale—North York Twp., rein.-con. addition to reservoir at waterworks plant, $25,000. G. Baker, Twp. Offices, engr.

BIDS ASKED

Ala., Mobile—See "Contracts Awarded."

Ind., Ft. Wayne—Oct. 27, by J. C. Trier, chn. Bd. P. Wks., filtration plant at Three Rivers Park, $1,000,000. Hoad, Decker, Shoecraft & Drury, Ann Arbor, Mich., engrs. Noted July 16.

Ia., Indianola—Oct. 5, by A. R. Smith, city clk., 400,000 gal. steel tank on tower, $25,000. Brown Eng. Co., 108 North Market St., Ottumwa, engrs.

Mass., Medfield—Oct. 2, by State, Dpt. Mental Diseases, State House, Boston, waterworks of driven wells at Medfield State Hospital. J. J. Van Valkenburg, Irving Sq., Framingham, engr.

Neb., Albion—Oct. 8, by F. M. Sillik, city clk., 9,456 ft. 4- to 10-in. Class B Inc. Wane open bell, DeLavand, mono-cast or Universal c.i. pipe, 5 tons c.i. specials, 3 hydrants, 38 valves and boxes, 760 ft. 6 in. and 100 ft. 8 in. pipe removed, 23 wet connections, 700 ft. trench under pavement, $17,339. Henningson Eng. Co., 326 Union State Bank Bldg., Omaha, engrs.

N. J., Paterson—Oct. 6, by Passaic Valley Water Comm., 158 Ellison St., cast stone, structural steel, ornamental iron for Great Notch Pumping Station, $5,000. Fuller & Everett, 25 West 43rd St., New York, engrs.

N. Y., Brooklyn—Oct. 6, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., New York, mains in Prospect Park, Ashland Pl., Linden Blvd., Avenues H, K, M, U and V, Fillmore, Scott, Voorhies and 19th Aves., Adams, Elton, Smith, 57th, East 46th, East 49th, East 64th, East 65th, East 66th and West 4th Sts.

N. Y., New York—Oct. 6, by J. J. Dietz, comr. Water Supply, Gas & Electricity, Municipal Bldg., mains in Van Courtland Park S., Crotona Park N. and E. Dash, Lohengrin and Parsifal and Colon Pls., Anderson, Bruner, Bussing, DeReimer, Grace, Howe, Laconia, Longstreet, Nelson, Pittman, Tenbroeck and Summit Aves., Pell, East 160th, East 161st, East 166th, East 167th, and West 236th Sts., Bronx Boro.

O., Youngstown—Bd. Control, bids about Mar. 20, 2 standpipes, elevated water storage tank where pressure is extremely low, alongside of reservoir in west side, $150,000.

Ore., Eugene—City Comm., bids about Nov. 20, 12 m.g.p.d., modern rapid sand type filter plant, 4 settling basins, 8 filter units, $220,000. Stevens & Koon, Spalding Bldg., Portland, engrs. Noted Sept. 17.

Tex., Corpus Christi—Oct. 15 (extended date), by City at office T. Koister, city secy., rehabilitating La Fruta Dam on Lake Lovenskiold, R. J. Cummins & H. E. Elrod, 1105 Nixon Bldg., Corpus Christi, or 727 Bankers Mortgage Bldg., Houston, consult. engrs. Noted Sept. 17.

B. C., Vancouver—Oct. 19, by City Council, 1,000 ft. 4 in., 300,000 ft. 6 in. and 15,000 ft. 8 in. c.i. pipe, $20,000. C. Brackenridge, City Hall, engr.

CONTRACTS AWARDED

Ala., Mobile—Extending water mains, day labor under supervision Engineering Dpt. $25,000. Noted

Calif., Monrovia—City Council, to United States Pipe & Fdry. Co., 3326 East 8th St., Los Angeles, 1,568 ft. 12 in. cast iron pipe at $1.12 per ft., 42,000 ft. 8 in. $0.635, 800 ft. 6 in. $0.45, 4.9 tons fittings at 80 per ton to Pacific Pipe & Supply Co., 442 South Raymond St., Pasadena, Los Angeles, 3,000 ft. 10 in. I. D. steel pipe dipped and wrapped for lap welding at $77.81 per 100 ft.

Ill., Millstadt—Millstadt Water Corp., E. W. Marxer, pres., 20,000 gal. rein.-con. surface reservoir, 75,000 gal. steel tank on tower, to A. P. Poirot, 721 East Washington St., Belleville.

Mass., Cambridge—Laying 24 and 36 in. water pipe, to J. Williams, Beechwood St., Dorchester, $47,750. Est. $50,000. Noted June 25.

Minn., Ely—City Council, A. O. Knutson, clk., installing pipe line from here to Burntside Lake, incl. 500 ft. intake pipe, 25,200 lin.ft. discharge pipe, materials, to Crane Co., 8 East Michigan Ave., Duluth, $68,170; installing line, to Maturi & Son, Chisholm, $49,000. Furnishing, installing 3 horizontal centrifugal motor-driven pumps, to Allis-Chalmers Co., 1502 Alworth Bldg., Duluth, $1,910. Grand total $119,080. Noted Sept. 3.

Neb., North Bend—Improving waterworks, incl. 50,000 gal. steel tank on tower, 100 ft. high, hydrants and valves, 16 in. tubular well.

See proposal advertising on page 76

Constr. News page 125

LEADITE

Trade Mark Registered U.S. Pat. Office

When LEADITE is used for jointing bell and spigot water mains—an "all-around" saving results—

Briefly, LEADITE "saves" in: Cost of Material—Caulking Expenses—Digging Bell-holes—Pumping wet trenches—Freight charges—Handling charges—Fuel Costs—Reduced leakage Costs—Interest Charges (by getting water in the line quickly)—Installation charges.

The pioneer self-caulking material for c. i. pipe.
Tested and used for over 30 years.
"Saves at least 75%

THE LEADITE COMPANY
Land Title Building - - - Philadelphia, Pa.

No Caulking

(Waterworks (Continued)

turbines, to Omaha Steel Wks., 609 South 28th St., Omaha, $17,000. Noted Sept. 14.

N. Y., New York—Bd. Water Supply, 346 Broadway, making test borings along line Delaware Aqueduct Tunnel in Carmel, Putnam Co., and Somers, North Salem and Bedford, Westchester Co. Contr. 315, to Osborne Drilling Co., 70 East 45th St., $13,545. Noted Sept. 3.

Utah, Salt Lake City—City Comn., culinary water system, for Brown-Sanford Dist., incl. c.i. pipe line distributing system, to Mullins & Wheeler, Salt Lake City, $32,800. Est. $36,000.

Wash., Wenatchee—City Comrs., 4 m.g. reservoir covering 130 x 170 ft. area, concrete slab roof, providing 3 tennis courts, to Concrete Constr. Co., Securities Bldg., Seattle, $61,785. Noted Aug. 27.

Wash., Wenatchee—Laying 37,000 ft. mains, part of new Wenatchee reservoir and water system improvement program, to L. Colucio, 1638 Lane St., Seattle, $25,000.

Wis., Menomonee Falls—Drilling well and equipment for 350 g.p.m., pump with guaranteed capacity of 350 g.p.m., to J. Egerer, 100 Washington Circle, Wauwatosa, $13,000. Est. $15,000.

Wis., Milwaukee—Mains in West Silver Spring St., to Wenzel & Henoch Constr. Co., 5025 State St., $10,591; in West Lisbon Ave., to Milwaukee Sewer & Drainage Co., 2510 North Humboldt Ave., $4,492.

Ont., Fort Erie—Council, pumping station and 1¼ mi. trunk main in Lake Shore Rds., to Carroll Sharp Constr. Co., 43 Scott St., Toronto, $53,000.

SEWERS

PROPOSED WORK

Calif., Capistrano Beach—Sanitary Dist. soon takes bids 500 lin.ft. 8 in. sewer, 2,100 lin.ft. 8 in. c.i. force main, pumping plant, sedimentation basins, 200 lin.ft. ocean outfall, $40,000 bonds voted for same; 22,000 lin.ft. 6 in. and 22,300 lin.ft. 8 in. sewers, $50,000. Burns-McDonnell-Smith Eng. Co., Western Pacific Bldg., Los Angeles, engrs.

Calif., Long Beach City Council cancelled bids to have been opened Oct. 2, North Long Beach Sewerage System (Pump Sewer Dist. 11), incl. 250,000 ft. 8 in. and 17,590 ft. 12 in. vitr. clay sewers, 95,600 ft. 6 in. vitr. connection sewers, 600 g.p.m. pumping station, incl. two 6 and one 8 in. pumps, due to failure to specify rate of wages. Will soon take new bids. Noted Sept. 14.

Conn., Norwich—Preliminary plans sewage disposal plant, $25,000. Chandler & Palmer, Thayer Bldg., Main St., engrs.

Ia., Allerton—Preliminary plans 10,560 ft. sanitary sewerage systems, sewage disposal plant, Elm, Maple, Oak, Pine, Spruce, Wayne and Green Sts., Buffalo and Central Aves., and 2 alleys. Brown Eng. Co., 108 North Market St., Ottumwa, engrs.

Ia., Cedar Rapids—Preliminary plans storm water sewers in northwest section. F. E. Young, City Hall, engr.

Nev., Sparks—City Council 2,600 lin.ft. 8 and 10 in. sewer (state will pay $10,000 of this cost); 2,000 lin. ft. 8 in. sewer replacement of present city sewer line (pipe to be purchased, work to be done by day labor). C. C. Taylor, city engr.

O., Columbus—City Council new 50 m.g.d.c. activated sludge type sewage disposal plant, on site of present plant, south of here, $4,000,000. Eng. Dpt. headed by R. H. Simpson will prepare plans, specifications. Noted July 17.

O., Euclid—For 2,300 ft. 12- to 30-in. vitr. tile storm sewers, Tungsten Rd. $75,000. I. T. Stewart, City Hall, engr.

Pa., Altoona—City, B. Keatley, comr. Pub. Imports, preliminary surveys sewage disposal plant. H. J. Baum, City Bldg., engr.

Pa., Brentwod—Boro 2 mi. 8 in. terra cotta sewers in Dist. 7, South Hills Country Club. R. A. Schneider, 2706 Brownsville Rd., Mt. Olive, Pittsburgh, engr.

Pa., Greentree—Boro, H. Wohlwend, secy., 2 mi. sanitary sewers, Potomac Street Dist.

Va., Norfolk—City several miles sewers within area bounded on north by Cromwell Rd., south Lafayette Blvd., east Flanders Ave. and west Flanders and Argonne Aves. $40,000-$50,000.

Wash., Omak—City Comrs. installing sewage district to cover entire town, $40,000. C. E. Dorisy, city engr.

Ont., Chapleau—Council, sewerage system. H. G. Acres, Ferry St., Niagara Falls, engr.

Ont., Eastview—Main sewer from Montreal Rd., to Ottawa River, $147,000. F. Patterson, Eastview, engr. Noted Sept. 17.

Ont., Kingston—For 8 in. and up vitr. tile sewers in Hull St., $400; Fraser, Joseph and Division Sts., $22,125; Russell St., $2,667; Napier St., $9,780; Elizabeth St., $7,880; Mack St., $1,480; Park and Regent Sts., $10,590; Toronto St., $1,227; and Johnston St., $3,635. H. S. Dick, City Hall, engr.

Ont., Ottawa—For 24 in. vitr. tile or concrete sewer in Kent St. from Laurier Ave. to Cooper St. $55,000. F. C. Askwith, City Hall, engr.

Ont., Peterborough—For 8 in. and up vitr. tile and storm and sanitary sewers, manholes, catchbasins, connections. $50,000. R. H. Parsons, City Hall, engr.

Ont., St. Thomas—A. Miller, city engr. preparing plans storm sewers, $30,000; Fingal Rd. subway, $21,000; grading, drainage structures, concrete paving Gravel Rd. $35,000. Question laying additional gas mains, costing $20,000 to be reported by engineer.

Ont., Thorold—Sewers, $42,400; concrete paving portions Portland, Regent, Colborne, Rose, Richmond, Niagara and King Sts., $34,-000. A. Chalmers, Town Hall, engr.

Ont., Toronto—Rein.-con. storm sewer outlet, piling, Pope Ave. $49,620. R. C. Harris, City Hall, engr.

Ont., Walkerville—Town, 8 in. and up vitr. tile sewers, $50,000. H. W. Patterson, Imperial Bldg., engr.

BIDS ASKED

Ala., Mobile—See "Contracts Awarded."

Calif., Hollister—Oct. 6, by H. O'Brien, city clk., 4,000 ft. 16 in. concrete storm sewer.

N. Y., St. George—Oct. 7, by J. A. Lynch, pres. Richmond Boro. Boro Hall, temporary sanitary sewers in Ocean View Pl. from Ramblewood to Armstrong Aves.

O., Cleveland—City taking bids (1st unit) $16,000,000 sewage disposal plant, foot East 40th St., incl. 1 story, 18 x 1,050 ft. brick, steel building to house valves, meters, also cofferdam with 3,000 ft. steel sheet piling 40 x 60 ft. pump house, thirty-two 27 x 340 x 15 ft. rein.-con. aeration tanks, sixteen 100 x 100 x 12 ft. sludge settling tanks. $1,000,000. G. B. Gascoigne, Leader Bldg., consult. engr. Noted Sept. 10.

O., Columbus—Oct. 6, by J. McSweeney, dir. P. Welfare, 9th and Oak Sts., turbo-generator unit at Ohio Penitentiary, $22,000. C. E. Morrow, State House, engr.

Ont., Belleville—See "Contracts Awarded."

CONTRACTS AWARDED

Ala., Mobile—Extending sanitary sewerage system, day labor, under supervision Engineering Dpt. $100,000.

Ariz., Tucson—City Comn., 6 and 8 in. sewer lines, sewers in Mabel and Helen Sts., Fremont, Santa Rita, Warren, Mountain, Highland, Vine and Cherry Aves., to Borderland Constr. Co., Tucson, $13,717. Est. $26,200. Noted Aug. 6.

Minn., Detroit Lakes—E. J. Bestek, clk., 2,154 lin.ft. 8 in. sewer, 7 manholes, 1 lamp hole, 1 flush tank, sewage lift consisting of underground rein.-con. structure to O. H. Bello, Detroit Lakes, $6,447. Noted Sept. 8.

Nev., Sparks—See "Proposed Work."

N. Y., New York—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave. sewers, to H. H. Sherwin & Co., 420 Lexington Ave., paving 30th Street Yard, to Meehan Paving & Constr. Co., 90 West St.

O., Cincinnati—Hamilton Co. Sewer No. 68, Dists. 3, 8 and 9, 14,296 ft., 30 and 33 in. rein.-con. and 3,158 ft. 8- to 24-in. vitr. clay pipe, to E. G. Connelly, 2nd Natl. Bank, $85,-709. Est. $174,908. Noted Aug. 27.

O., Columbus—R. S. McPeak, serv dir., Alum Creek Storm Standby Tank, 208 x 119 x 15 ft. steel, involving 9,800 cu.yd. excav., 8,000 cu.yd. concrete and 1,000,000 lb. steel, to D. W. McGrath & Sons Co., 255 East Broad St., $152,041. Noted Aug. 27.

O., Columbus—R. S. McPeak, dir. serv., 60 x 25 x 23 ft., 33 x 16 x 23 ft., 38 x 20 x 26 ft. and 87 x 27 x 22 ft., rein.-con. regulator chambers, for intercepting sewer, incl. 14,400 cu.yd. excav., 3,100 cu.yd. concrete, 44,000 lb. structural steel, 380,000 lb. reinforcing steel, to N. Cenci, 1381 Essex Ave., $106,310. Noted Aug. 27.

Okla., Boise City—C. A. Haskins, engr., 822 Finance Bldg., Kansas City, Mo., new sanitary main and lateral sewerage system, sewage disposal plant, to Earl W. Baker & Co., 227 Southwest 21st St., Oklahoma City, $91,863. Est. $100,000. Noted July 2.

Pa., Erie—H. L. Munger, dir. Streets, City Hall, sewage lift station in connection with sewage disposal plant, sewer line from Lake Rd. to lake shore along Hess Ave. into plant proper, to J. and M. Doyle, 307 Walnut St., Erie, $15,000, electric work on lift plant, to Hill Electric Co., Erie, $458. Noted May 14.

Tex., Mineola—City, c/o J. Russell, mayor, sanitary sewerage system improvements, 11,875 ft. sewer pipe, disposal works, incl. settling tank, pump station, dosing tank, filter, to Panhandle Constr. Co., Lubbock.

Ont., Belleville—Sanitary sewers in King and Everett Sts., day labor, $39,795. C. A. Mott, City Hall, engr.

Ont., Fort Erie—City Council, 8 in. and up vitr. tile sanitary sewer in Lake Shore Rd. and sewage pumping station, to Carroll-Sharp Constr. Co., Ltd., 43 Scott St., Toronto, $53,000.

BRIDGES

PROPOSED WORK

Calif., Los Angeles—Bd. Comrs. Los Angeles Co., rebuilding 704 ft. wood truss bridge, incl. eleven 60 ft. Howe truss spans over Los Angeles River at Redondo Blvd. $40,000. W. D. Armstrong, Hall of Records Bldg., engr.

Calif., Santa Monica—See "Excavation, Drainage, Irrigation, Levees, River and Harbor."

La., New Orleans—Orleans Levee Bd., Camp and Common Sts., 2 steel, concrete bridges over Bayou St. John, with space for automobile and pedestrian traffic, $400,000.

Mass., Lynn—Commonwealth of Massachusetts, Dpt. P. Wks., State House, Boston, bids in December, 100 ft. steel, concrete draw bridge, granite piers, 60 ft. four alley road, 7 ft. sidewalks over Saugus River. To exceed $25,-000. A. W. Dean, Dpt. P. Wks., Boston, engr.

North Dakota and Minnesota—Hy. Dpt. of North Dakota, Bismark, Hy. Dpt. of Minnesota, St. Paul, Cass Co. (Fargo) N. D. and Clay Co. (Moorhead) Minn., steel, concrete bridge over Red River of North, on Front St., Fargo, N. D., $80,000. F. F. Doherty and Cass Co., Fargo, N. D.

Oklahoma—State Hy. Dpt. Oklahoma City, preliminary plans 1 span 160 ft. steel truss bridge on concrete piers, at Hodgens, Le Flore Co. $35,000; 9 span 146 ft. bridge at Sayre, Beckham Co. $27,000. C. L. Wilson, hy. engr.

Okla., Tulsa—City and State Hy. Dpt., Oklahoma City, plans widening 14,700 ft. bridge from 30 ft. roadway and two 5 ft. sidewalks to 40 ft. roadway and one 7 ft. sidewalk and street car tracks over Arkansas River at Quannah Ave. $250,000. Wood & Witten, Lynch Bldg., engrs.

Okla., Vici—State Hy. Dpt. Oklahoma City, preliminary plans 8 span 122 ft. rein.-con. bridge, Dewey Co., $27,000. L. C. Wilson, hy. engr.

Tex., Amarillo—City, c/o W. N. Durham, and Chicago, Rock Island & Pacific Ry., N. H. Petersen, Chicago, Ill., ch. engr., rein.-con. viaduct, 8th Ave. E. N. Stanley, Amarillo engr.

Utah—State Road Comn., Salt Lake City, bids in spring 3 steel bridges, each over 600 ft. long, one over Colorado River at Moab, one over Green River, at Jensen, one at Green River. H. S. Kerr, state road engr.

Wis., Green Bay—Steel, concrete bridge, with 60 ft. draw, electrically operated, Monroe St., $100,000. Klug & Smith, 69 East Wisconsin Ave., Milwaukee, archts.

Ont., Port Stanley—Elgin Co., 250 ft. steel, concrete hy. bridge, $50,000. F. A. Bell, Court House, St. Thomas, engr.

BIDS ASKED

Calif., San Francisco—Oct. 7, by C. H. Purcell, ch. engr., San Francisco Bay Bridge, San Sansome St., investigating found. sites for San Francisco Bay Toll Bridge, incl. diamond drill and jet borings, driving castings and test piles, loading piles with test loads, for California State Toll Bridge Authority. Total est. $72,-000,000. This corrects report in Sept. 24 issue.

Iowa—Oct. 13, by State Hy. Comn., Ames, three 40 x 24 ft. span I-beam bridge, 11 culverts on Rd. 187 south of Lamont, B-744. Buchanan Co.—80 x 20 ft. pony truss bridge with two 40 x 20 ft. I-beam approach spans, Rd. 104 northwest of Ft. Madison, B-743, Lee Co.—90 x 24 ft. plate girder bridge with two 40 x 24 ft. I-beam approach spans, Rd. 14 south of Knoxville, B-666, Marion Co.—three 32 x 24 ft. span I-beam bridge, two 150 x 20 ft. high trusses with two 40 x 20 ft. I-beam approach span, 32 x 24 ft. I-beam bridge, three 40 x 20 ft. span I-beam bridge, one 60 x 24 ft. I-beam bridge, on Rd. 148 North of Red Oak, B-726, Montgomery Co.—10 x 4 ft. box culvert, Rd. 177 east of Carson, B-645—abutment protection on 120 x 20 ft. high truss bridge, incl. steel sheeting and riprap, Rd. 83 in Avoca, B-631, both Pottawattamie Co.—20 x 16 ft. box culvert, Rd. 20 in Sioux City, B-45, Woodbury Co. C. R. Jones, aud.

Ia., Clarinda—Oct. 15, at office Auditor Page Co., two 90 x 16 ft. and one 60 x 18 ft. pony truss bridges, all with wood floors, creosoted pile abutments. Address County Engineer, or Auditor, Clarinda.

Ia., Logan—Oct. 7, at office Auditor Harrison Co., 105 x 16 ft. high truss bridge with two 24 x 16-ft. I-beam approach spans, 90 x 16 ft. pony truss bridge with 20 x 16 ft. and 28 x 16-ft. I-beam approach spans. Address County Engineer or Auditor.

Ind., Evansville—Oct. 8, by Comrs. Vanderburgh Co., bridge over Pigeon Creek, at West Franklin St. $130,000. E. D. Koeneman, Evansville, co. aud.

Michigan—Oct. 6, by H. W. Hazaman, div. engr., Saginaw, FBr. 1 of 79-23-14, Comrs. 1 and 2, two 60 ft. spans, 2 rein.-con. abutments, steel deck girder, rein.-con. flooring, two 24 ft. sidewalks, Tuscola Co., for State Hy. Comn., Lansing.

Michigan—Oct. 7, by W. J. Kingscott, div. engr., at office Van Buren Co., Road Comn., Paw Paw, State Reward Br. 1 of 80-9-23C, 1 and 2, one 55 ft. span, 2 rein.-con. abutments, steel deck girder, rein.-con. flooring, spindle railing two 1½ ft. sidewalks, and State Reward Br. 1 of 80-11-23C-1 and 2, two 50 ft. spans, 2 rein.-con. abutments, steel deck girder, rein.-con. flooring, concrete surface, two 1½ ft. sidewalks, both Van Buren Co., for State Hy. Comn., Lansing.

Michigan—Oct. 8, by W. J. Kingscott, div. engr., at office Muskegon Co., Road Comn., Muskegon State Reward Br. 1, of 61-13-23 C 1 and 2, 862 ft. long, 2 rein.-con. abutments, steel deck girder with 9 pier spans at 18 ft. and 10 seventy ft. spans with concrete flooring, 3 ft. sidewalks, Muskegon Co., for State Hy. Comn.

New York—Oct. 6, by A. Goldman, comr. Plant & Structures, Municipal Bldg., New York, masonry piers for towers of Triborough Bridge, connecting Boros Manhattan, Bronx and Queens. Noted Sept. 17.

N. Y., Buffalo—W. Rathmann, comr., P. Wks., Municipal Bldg., bids about Oct. 15, Michigan Ave. lift bridge across Buffalo River, $100,000. Noted June 11.

Virginia—See "Streets and Roads."

Wis., Milwaukee—Oct. 6, by Dpt. P. Wks., City Hall, 3,936 ft. wood or concrete bridge over 35th St. $300,000 to $400,000. Former bids rejected. D. McKeith, comr. Noted Aug. 27.

CONTRACTS AWARDED

Calif., San Jose—J. J. Lynch, city clk., rein.-con. bridge over Guadalupe Creek in San Augustine St. to R. O. Summers, 17 North First St., $20,563.

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Bridges (Continued)

Calif., Santa Cruz—H. Miller, clk., Santa Cruz Co., rein.-con. bridge over San Lorenzo River, near Felton Acres, to S. Scairriano, 498 Park Ave., San Jose, $17,980. Noted Sept. 3.

Indiana—State Hy. Comn., Indianapolis, 36 ft. rein.-con. arch span bridge, incl. 12,576 lb. reinforcing bars, 1,840 ft. piling, ninety-two 20 ft. piles, Contr. 420, to R. P. Olinger, Huntingburg, $7,880 est. $10,612; 36 ft. span rein.-con. bridge over Plum Creek and 40 ft. rein.-con. bridge over east fork Plum Creek, Contr. 438, to Hill & Leary, Greenfield, $11,774 est. $17,121, all Putnam Co. Noted Aug. 13.

Ia., Atlantic—Cass Co., two 32 x 20 ft. I-beam span bridge, 80 x 20 ft. pony truss span bridge, two 24 x 20 ft. I-beam span bridge, 70 x 20 ft. pony truss span bridge, 140 x 20 ft. high truss span bridge, 122 x 16 ft. high truss span bridge, also repairing 122 x 16 ft. high truss span bridge, to A. Melberg, Cedar Rapids, $29,310. Noted Aug. 20.

La., New Orleans—State of Louisiana acting through State Advisory Bd., c/o H. P. Lang, chn., and City, acting through Public Belt R.R. Comn., T. M. Walmsley, pres., at Council Chamber, City Hall, railroad and hy. bridge over Mississippi River, near here, Contr. 3, substructure main bridge spans, to Siems-Helmers Co., Inc., 1014 Guardian Bldg., St. Paul, Minn., $3,083,185; Contr. 4, superstructure main bridge, to American Bridge Co., 71 Bway., New York, and 208 South La Salle St., Chicago, Ill., $2,618,670; Contr. 5, substructure approaches, to MacDonald Eng. Co., 1 North La Salle St., Chicago, Ill., $496,337; Contr. 6, superstructure approaches, to McClintic-Marshall Co. (Bethlehem Steel Corp.), Oliver Bldg., Pittsburgh, Pa., $3,226,789. Grand total $9,424,981. Total est. $19,000,000. Noted Aug. 6.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, triple span concrete arch bridge over Wills Creek, Contr. A-101-67, Allegany Co., to G. F. Hazelwood, Cumberland, $47,476. Noted Sept. 3.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, structural steel superstructure for bridge over Deer Creek, Contr. H-126-44, Harford Co., to Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa., $6,700. Noted Sept. 10.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, concrete girder bridge on Garrett Park Rd., Contr. M-174-37, Montgomery Co., to J. S. Bowers, Whiteville, N. C., $11,003. Noted Sept. 3.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, concrete girder bridge (1,136 ft. between abutments), on concrete pile substructure, incl. bascule piers, operator's houses, approaches over Bohemia River, Contr. Ce-108-27, Cecil Co., to Sanford & Brooks Co., Canton House, Baltimore, $173,435; concrete girder bridge over Rock Creek, Contr. M-176-35, Montgomery Co., to G. A. Crandall, Sudley, $11,225. Noted Sept. 10.

Massachusetts—Essex Co., Court House, Salem, reconstructing bridge over Merrimack River, Haverhill and Groveland, to A. Robidoux, 58 Middlesex St., Bradford. Est. $25,000.

Minnesota—State Hy. Dpt., 1240 University Ave., St. Paul, two 30 ft. span concrete bridge, State Project 14-26-2, Marshall Co., to Guaranty Constr. Co., 416 Essex Bldg., Minneapolis, $26,496. Noted Sept. 3, under Streets and Roads.

Montana—State Hy. Comn., Helena, bridges on Big Timber Columbus Rd., Sweet Grass Co., to T. W. McGeever, Butte, $12,717, est. $17,298—9 trestles on Miles City-Broadus Rd., Custer and Power River Counties, to Elliott & Nesbit, Sand Point, Idaho, $17,390, est. $20,588—4 span concrete bridge over Armells Creek, Rose Bud Co., to North West Eng. Co., Rapid City, S. D., $12,615, est. $16,555. Grand total $42,722.

Md., Baltimore—Bd. Awards, at office City Register, City Hall, 560 ft. rein.-con., steel bridge, 36 ft. wide, concrete piers, two 6 ft. roadways, water pipe structures, pile found., over Pennsylvania R.R., Lafayette Ave., to Marocco Contg. Co., 3700 Forest Park Ave., $98,921. Noted Aug. 20.

New Jersey—State Hy. Comn., Trenton, bridge over Weston's Mill Pond, Middlesex Co., to Gray Constr. Co., Morristown, $109,805. Noted Sept. 3.

New Jersey—State Hy. Comn., Trenton, bridge in Bergen Co., to J. A. Rubino, Port Newark, $39,990. Noted Aug. 27.

N. J., West Milford—Passaic Co., Court House, Paterson, steel beam bridge over Ringwood Ave., to J. H. Magee, Haledon. Est. $25,000. Noted July 23.

New York—A. W. Brandt, comr. Hys. Dpt. P. Wks., Albany, 105 ft. plate girder bridge over 18 Mile Creek on East Eden-Hamburg Hy., 1335, to P. Deperro, 361 Swan St., Buffalo, $43,285; 0.16 mi. rein.-con. grade crossing on Lewiston Dickersonville Hy., 617, Niagara Co., to Cefali-Hall, South Wales, $59,376. Noted Aug. 29.

Ohio—State, O. W. Merrell, hy. dir., Columbus, rein.-con., structural steel bridge, 40 ft. roadway, two 5 ft. sidewalks, Sect. "Bedford" Akron-Cleveland Rd., Cuyahoga Co., to E. H. Latham Co., 447 Neilson St., Columbus, $321,335—72 ft. steel beam bridge, 24 ft. roadway, Sect. "B" Baltimore-Reynoldsburg Rd., Fairfield Co., to H. L. Maddocks, Newark, $13,513—45 ft. span, concrete beam bridge, approaches, 24 ft. roadway, Sect. "B" Dayton-Germantown Rd., Montgomery Co., to Fritz-Rumer-Cooke Co.,

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209 South High St., Columbus, $7,340. Grand total $342,188. Noted Sept. 1 and 17.

Wash., Seattle—S. J. Humes, comr. Hys., Olympia, north approach, fill and undercrossing Lake Union Bridge State Rd., King Co., to West Coast Constr. Co., 1011 Lloyd Bldg., $116,378. Noted Sept. 3.

West Virginia—State Hy. Comn., Charleston, substructure for Bridge 1287, Hardy Co., to Gilbert Constr. Co., Glen Hedrick, $10,025—superstructure for above bridge, to Fairmont Mining Mchy. Co., Fairmont, $10,200—Bridge 1281 over Little Sandy River, Preston Co., to C. C. Dodd, Spencer, $6,150. Grand total $26,375.

Ont., Hawksburg—Dpt. P. Wks., Ottawa, substructure and rein.-con. floor slabs for two 38 ft. clear span bridges over Ottawa River, on Hawkesbury approach roadway to Inter-provincial Hy. Bridge, to A. Latham, Alexandra, $17,192.

STREETS AND ROADS

BIDS ASKED

Ala., Mobile—See "Contracts Awarded."

California—Oct. 7, by C. H. Purcell, ch. engr. State Hy. Comn., Sacramento, grading, concrete paving 5.1 mi. road between Washington Blvd. and El Segundo, Los Angeles Co.; 5.8 mi. road between Los Berros Creek and Arroyo Grande, San Luis Obispo Co.

California—Oct. 14, by State Hy. Comn., Sacramento, grading, selected material surfacing 8.3 mi. road between Rocky Creek and San Remo Divide, Monterey Co.—grading 1.6 mi., concrete surfacing 2.7 mi. road between Newcastle and Power House, Placer Co.—grading, asphaltic concrete surfacing 5.2 mi. road between Greenville and Livermore, Alameda Co. C. H. Purcell, hy. engr.

Calif., Glendale—City Council taking new bids and open same about Oct. 7, 1½ in. paving 680,000 sq.ft. Glendale Blvd. Former bids rejected. Noted Sept. 3.

Calif., Los Angeles—Bd. Supervs. Los Angeles Co. taking bids improving Impvt. 982, Orangewood Blvd., et al. near intersection Anaheim-Telegraph Rd. and San Gabriel Blvd., incl. 33,847 cu.yd. excav., 28,659 ft. curbing, 111,470 sq.ft. 6 and 8 in. guttering, 22,687 sq.ft. 3.5 in. sidewalks, 408,039 sq.ft. 4 and 6 in. Bitumuls full-penetration pavement, 112,755 sq.ft. 4 in. D.R. base, 468 lin.ft. curb armor, $138,000. G. W. Jones, Hall of Records Bldg., engr.

Calif., Los Angeles—Oct. 19, by Bd. Supervs., Los Angeles Co., improving Orangewood Blvd., incl. 33,847 cu.yd. excav., 397,915 sq.ft. 4 in. 110,125 sq.ft. 6 in. Bitumuls paving, 112,755 sq.ft. 4 in. D.R. base.

Calif., Riverside—Bd. Comrs. Riverside Co., received no bids Sept. 8, grading, corrugated metal culverts, 6 in. California road mix surfacing 1,020,000 sq.ft. Co. Impvt. 7 (vicinity of Indio). Noted Sept. 3.

Calif., Salinas—See "Contracts Awarded."

Calif., San Rafael—R. E. Graham, clk. Marin Co. taking bids 1,070,000 sq.ft. emulsified asphalt and screening in place on 10.7 mi. Manzanita-Bolinas Rd.

Calif., Ventura—Oct. 20, by L. E. Hallowell, clk. Ventura Co., 2 in. asphaltic macadam surfacing 108,000 sq.ft. streets. Cash Contr. 760.

Delaware—Oct. 20, by State Hy. Dpt., Dover, grading, concrete sidewalks, 2.35 mi. Farnhurst to Wilmington City Line, Contr. 204—1.25 mi. Rosehill School to Eden Park, Contr. 205—0.5 mi. City Line to Shellpot, Contr. 206; adv. E.N.-R. Oct. 1.

Ill., Bloomington—Oct. 5, by Bd. Supervs. McLean Co., gravel surfacing 0.7079 mi. U-M. F.T., 16 ft. G. H. Baker, c/o State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, engr.

Ill., Greenville—Oct. 6, by Bd. Supervs. Bond Co., traffic bound gravel or stone surfacing 1.6249 mi. Sect. 2-1-15d, 16 ft. G. H. Baker, c/o State Dpt. P. Wks. & Buildings, Div. Hys., Springfield, engr.

Iowa—Oct. 13, by State Hy. Comn., Ames, grading, drainage structures 0.294 mi. U. S. Rd. 18 from Big Sioux River Bridge east, P-299, Lyon Co.—gravel surfacing 10 mi. Rd. 3, from Leon east, F-300, Decatur Co.—0.66 mi. U. S. Rd., 55 at Sagehill Overhead Crossing, X-661, Dubuque Co.—11.429 mi. Rd. 25 south from Guthrie Center, P-646, Guthrie Co.—13.3 mi. Rd. 73 from Marengo northwest, P-784, Iowa and Benton Counties—4 mi. Rd. 78 from U. S. Rd. 61 to Rising Sun, P-785, Louisa Co. C. R. Jones, asst.

Ia., Cumming—Oct. 5, at office F. A. Felton, town clk., Class A, B and C gravel or mine shale surfacing 1 mi. streets, delivered and dumped on streets.

Ia., Des Moines—Oct. 5, at office Auditor Polk Co., gravel surfacing 9.24 mi. road.

Ia., Elkador—Oct. 7, at office Auditor Clayton Co., crushed limestone surfacing 24,310 cu.yd. various projects. Address County Engineer, Elkador.

Ia., Onawa—Oct. 5, at office Auditor Monona Co., grading, drainage structures 1.71 mi. county trunk roads; also dragline work 1.41 mi. trunk roads. Address County Engineer or Auditor.

Ia., Pocahontas—Oct. 6, at office Auditor Pocahontas Co., grading, incidental work 2 mi. local roads, incl. 15,000 cu.yd. excav. A. L. Thornton, Pocahontas, co. engr.

Kansas—Oct. 5, by State Hy. Comn., Court House, Mankato, sand gravel or chat surfacing 5.549 mi. Project 28-5, Kansas Project 1231, Jewell Co. W. V. Buck, Court House, Topeka, hy. engr.

Louisiana—Oct. 20, by State Hy. Comn., Baton Rouge, gravel surfacing 3.8 mi. Route 368 between Maxie and Route 1024—4.2 mi. Route 1021 between Routes 377 and 363, to Acadia Co.—6 mi. Route 598 between Dora and intersection with Route 30—4 mi. Route between Petite Cote and Route 72—4 mi. Ro 602 between Bunkie and intersection with R 72—5 mi. Route 1160 between Coules de C and Route 5—4 mi. Route 300 between L Chortque and Route 823, all Avoyelles Pa —6 mi. road between Singer and Longvil 11 mi. road between Calcasieu Parish Line Hyatt, both Beauregard Parish—2.1 mi. between Mount Olive and Liberty Hill, B ville Parish—4.3 mi. Foules-Tensas Line-I section Route 819 on Routes 67 and 1061— mi. road between Jones Bayou and Mont both Catahoula Parish—3 mi. Route 1285 tween Joes Bayou and intersection with R 45—2.7 mi road between Monticello School Joes Bayou—3.3 mi. Route 1287 between M son Parish Line and Route 95, all East C Parish—5 mi. Pine Prairie-Beaver Hy.—4.5 road between Villa Platte and Tates Cove, Evangeline Parish—4.6 mi. road between dieville and Fort Necessity, Franklin Pari 2 mi. road between New Verda and Faircl Grant Parish—6 mi. Route 547 between O man and Route 13, via Hebron—6.4 mi. north and south through Eros., both Jack Parish—5.5 mi. road between Waverly and W saw Ferry, Madison Parish—5 mi. road betw Derry and Gorum—4.3 mi. road betw Clountersville and Red River, both Natchito Parish—4.1 mi. road between Red Cross Bayou Latanache, Pointe Coupee Parish— mi. road between Evans and Beauregard, Ver Parish—2.5 mi. Route 357, Polkville-Hu Intersection with Route 25, Iberia and St Martin Parishes—shell surfacing 9.2 Routes 336 and 388 between Hecker and int section Route 489, Calcasieu Parish—5 Routes 516, 799 and 816—2 mi. road n and west through Caddinade—6.2 mi. R 513 between Routes 45 and 26, Vermili Co.—local iron ore surfacing 6.7 mi. road tween Price and Peach Orchard and Hob Calcasieu Parish—gravel and local iron surfacing 2.5 mi. road east through Readhi Natchitoches Parish—grading, drainage str tures 9 mi. Route 1059 between Routes and 151, Allen Parish—2.3 mi. road betw Hope and Sailes—7.9 mi. road between R gold and Cickers Landing, both Bienville —5 mi. road between Scottsville and Mi Fork—4.7 mi. Route 557 between Tulip Route 115—6.7 mi. Route 488 between Rou 11 and 115, all Claiborne Parish—4.5 mi. road between Belle Beau and Francisville, DeSo Parish—7 mi. road between Ouachita Pari Line and Hoods Mill, Jackson Parish—6 mi. road between Camuti and Clear Lake, Natchitoches Parish—9.3 mi. Route 816 between Truxno and intersection Route 411—4.5 mi. road between Camp Creek School and Cherry Ridge, both Union Co.—6.6 mi. Route 2 between DuBach and Route 11, Union and Lincoln Parishes—5 mi. road between Choudrant and Cartwright, Lincoln and Jackson Parishes —bridge over Bayou Bienvenu on Varsailles— Chef Menteur Hy., Orleans and St. Bernard Parishes—bridge over Tangipahoa River between Amite and Franklinton, Tangipahoa Parish. H. B. Henderlite, hy. engr.

Louisiana—Oct. 20, by State Hy. Comn., Baton Rouge, clam shell surfacing 8.9 mi. road between Golden Meadow and Grand Isle, Lafourche Parish—7.5 mi. road between Plaquemine and Grosse Tete, Iberville Parish—3.5 mi. road between Kenner and Lake Shore Hy., Jefferson Parish—gravel surfacing 6.5 mi. Routes 716 and 717 between Routes 719 and 734—7 mi. Routes 729 and 730 between Route 24 and Thompsons School, both Jefferson Parish—6.1 mi. intersection Route 31-Seiper-Vernon Parish Hy., Routes 322 and 624 Rapides Parish—5.8 mi. Route 225 Fairview-Alpha-Intersection Route 9 Red River Parish—6.2 mi. Route 143 between Routes 54 and 690 Richland Parish—9.1 mi. road between Zwolle and Blue Lake, Sabine Parish—8.1 mi. road between Evans and Beauregard Parish line—4 mi. Route 501 between Routes 21 and 138, both Vernon Parish—7.1 mi. road east and west through Darnell—6.5 mi. road east and west through Pioneer—3.1 mi. road between Forrest and Bayou Macon Bridge—6.4 mi. road between Evergreen and Jonesville School, all West Carroll Parish—5 mi. road from Pine Ridge south Winn Parish—5 mi. Route 468 between Routes 34 and 971 2 mi. Route 409 between Routes 189 and 469, both Washington and St. Tammany Parishes—7.2 mi. road between Eunice and Frey, St. Landry and Acadia Parishes—local iron ore surfacing 4.9 mi. road between Zwolle and Evarb School, Sabine Parish—local clay gravel surfacing 4 mi. road between Elmer and Calcasieu River Rapides Parish—grading, drainage structures 7.1 mi. road between Sikes and Hood Mill, Winn and Jackson Parishes—4.6 mi. road between Jena and Routon, La Salle Parish—5.7 mi. Route 143 between DeSoto Parish and Route 412 Sabine Parish—5.3 mi. Route 182 between Eaton and Route 185 Webster Parish—8 mi. road between Winfield—Prarie Home—Atlanta Hy., Winn Parish—4.4 mi. Route 441 between Routes 1066 and 101 Lincoln and Bienville Parishes—5.2 mi. Route 422 between Routes 25 and 43 Lafayette and St. Martin Parishes—bridge over Bogue Chitto River between Franklin and Amite, Washington Parish—overhead crossing over Texas, Pacific & Rock Island R.R. between Alexandria and Lecompte, Rapides Parish. H. B. Henderlite, hy. engr.

La., Bastrop—Oct. 8, by Police Jury, Morehouse Parish, gravel surfacing 4 mi. Bastrop-Hamberg Hy. J. Lester White, Bastrop, engr.

La., Lafayette—Oct. 6, by Bd. City Trustees, widening, concrete paving 7,200 sq.yd., concrete

Streets and Roads (Continued)

or asphaltic concrete paving 10,200 sq.yd. V. E. Smith, City Hall, engr.

La., New Orleans—See "Airports," under "Proposed Work."

La., Rayne—Oct. 12, by L. J. Voorhies, Baton Rouge, curbing, guttering, grading, paving 6,000 sq.yd.

La., Shreveport—Oct. 6, by City Comn. Council, paving, probably asphaltic concrete, Milan St. Extension from common through Reynolds to Baker Sts.

Maryland—Oct. 6, by State Roads Comn., G. C. Uhl, chn., Baltimore, concrete paving 0.88 mi. Contr. A-104-63, Allegheny Co.—1.21 mi. Contr. B-217-42, Baltimore Co.—1.5 mi. Contr. S-046-12, Somerset Co.—macadam paving 1.55 mi. Contr. M-182-52, Montgomery Co.—concrete shoulders 1.46 mi. Contr. P-128-811 Prince George's Co.; adv. E.N.-R. Oct. 1.

Massachusetts—Oct. 6, by Dpt. P. Wks., A. W. Dean, engr., State House, Boston, gravel and tar surfacing 4,283 ft. by Northboro—4,292 ft. Royalston—3,687 ft. by Phillipston—bituminous macadam paving, incl. concrete slab extension to stone arch, 1,540 ft. Millis—983 ft. Grafton—bitulithic concrete, Type A, with special bitulithic concrete paving 14,016 ft. Barnstable.

Mass., Boston—Oct. 3, by Dpt. P. Wks., J. A. Rourke, comr., sheet asphalt or bitulithic paving Barker St., Ward 22. $25,000.

Mass., Boston—Oct. 15, by Metropolitan Dist. Comn., Parks Div., widening, extending Boston Embankment, incl. 725,000 cu.yd. filling in Charles River Basin, 1,050 cu.yd. rein.-con. masonry, etc. E. H. Rogers, 20 Somerset St., dir. Park Eng.; adv. E.N.-R. Oct. 1.

Minn., St. Paul—Oct. 6, by C. A. Carlson, city purch. agt., improving Snelling Ave. between Laurel and Marshall Aves. and between Sherburne Ave. and Charles St., to exceed $25,000. 3rd Street Esplanade between Jackson and Third Sts. W. N. Carey, city engr.

Neb., Grand Island—Oct. 7, by City Clk., storm sewers. To exceed $25,000. Black & Veatch, 700 Mutual Bldg., Kansas City, Mo., engrs.

New Jersey—Oct. 15, by Bd. Freeholders Morris Co., Court House, Morristown, grading, 9 in. rein.-con., paving 75,320 sq.yd. Route 10, Sect. 3, Whippany to Route 5 (1917) Morris Co. W. S. Hopkins, co. engr. Noted Sept. 3 Daily.

New Mexico—Oct. 8, at office W. R. Eccles, state hy. engr., Santa Fe, grading, drainage structures, bridge on 8.2 mi. Federal Lands Hy. Project 1, Federal Aid Project 125-A, on U. S. Rd. 66-85, Bernalillo and Valencia Counties 4.1 mi. Federal Lands Hy. 2-A, on U. S. Rd. 66, Valencia Co.

New York—Oct. 13, by Westchester Co. Park Comn., 72 West Pondfield Rd., Bronxville, grading 1.95 mi. Saw Mill Parkway from Tarrytown-White Plains Rd., Elmsford to Tarrytown Rd. in Eastview, located in Greenburgh. J. Downer, ch. engr.; adv. E.N.-R. Oct. 1.

N. Y., New York—Oct. 6, by S. Levy, pres. Manhattan Boro. Municipal Bldg., grading, sheet asphalt on concrete paving Convent Ave., Beekman and Pearl Sts.

N. Y., New York—Oct. 7, by H. Bruckner, pres. Bronx Boro, Crotona Park, 3rd and Tremont Aves., grading, curbing, sidewalks on Hoxie St., Turnbull, Ely, Netherland, Pearsall, and Van Nest Aves.; sewer in Holland Ave.

Rhode Island—Oct. 7, by State Bd. Roads, State House, Providence, rein.-con. paving 6.2 mi. South Kingstown, Richmond and Charlestown, Contr. 3103, Federal Aid Project 65-C, bituminous macadam (penetration method) paving 2.5 mi. Contr. 3112, Narragansett.

Virginia—Oct. 13, by State Hy. Dpt., Richmond, clearing, grubbing, grading, drainage structures 1 mi. Route 16, Project S-206-F1 Madison Co.—0.8 mi. Callao Rd., Route 607, Project S-656-D Northumberland Co.—5.2 mi. Bent Creek Rd., Route 307, Project S-713-AB1, inclu. bridge over 20 ft. span over West Fork Bent Creek, 36,795 lb. reinforcing Appomattox Co.—four 45 ft. span rein.-con. beam bridge over Middle Fork Holston River, incl. 93,000 lb. reinforcing steel, Route 10, Project F-603-B, near Ford, Smyth Co. H. G. Shirley, hy. engr.

Washington—Oct. 13, by S. J. Humes, dir. hys., Olympia, concrete paving 0.9 mi. Pacific Ave., 40 ft., Tacoma, Pierce Co.—crushed stone surfacing 27,170 cu.yd. State Rd. 6, Newport North and South, Pend Oreille Co.—11.7 mi. State Rd. 7, Vantage to Burke, Grant Co.—6.1 mi. State Rd. 9, Forks to Bogachiel River, Clallam Co.—reconstructing substructure on approaches and span over Northern Pacific Ry. tracks south of Castle Rock, Cowlitz Co.—constructing bridge over West Twin Creek, East Twin Creek, Slippery Creek, Greenwater River, Scatter Creek, and rein.-con. box culvert at Cyclone Creek, King and Pierce Counties.

Wash., Port Orchard—Kitsap Co. Comrs. taking bids constructing Brownsville-Keyport Hy. $40,000. J. L. Berry, Port Orchard, engr.

British Columbia—See "Contracts Awarded."

CONTRACTS AWARDED

Ala., Mobile—City, completing resurfacing wood block paving, day labor under supervision Engineering Dpt. $170,000.

Ark., Mena—City Council, grading, curbing, guttering, sewers, 6 in. concrete paving 13,940 sq.yd. with marginal reinforcement, 9-6-9 in. Bates type concrete paving, 10,780 sq.yd. with marginal reinforcement, 6 in. gravel or macadam shoulders 3,200 sq.yd., streets in paving Dist. 6, to Phoenix Constr. Co., Ft. Smith, $50,424.

California—C. H. Purcell, engr. State Hy. Comn., Sacramento, concrete, asphaltic concrete paving road between Fullerton and westerly boundary, Orange Co., to Oswald Bros., 366 East 58th St., Los Angeles, $111,495. Noted Sept. 10.

Calif., Nevada City—Nevada Co., grading, emulsified paving Grass Valley-Peardale-Chicago Park-Bear River Rd., to Capitol Constr. Co., West Sacramento, $56,885. Noted Sept. 24.

Calif., Pomona—Curbing, guttering, 6 in. concrete paving 189,954 sq.yd. Fulton Rd., to H. H. Lienau, Anderson Bldg., San Bernardino, $34,484.

Calif., Salinas—Bd. Supervs. Monterey Co. improving Vineyard Canyon Rd., incl. 35,000 cu.yd. excav., 13,000 sta.yd. overhaul, 12,000 cu.yd. gravel, own forces. Former bids rejected. Noted Sept. 17.

Calif., Santa Ana—Orange Co., improving Carbon Canyon Rd., incl. 182,500 cu.yd. excav., 185 cu.yd. concrete, to S. M. Milovich, 1413 Whittier Blvd., Montebello, $43,995.

Calif., Santa Clara—Curbing, sidewalks, concrete paving 9,750 sq.ft. San Francisco Rd. et al. to Union Paving Co., Call Bldg., San Francisco, $101,930.

Calif., Santa Clara—Asphaltic concrete paving Alameda St. and asphaltic concrete repaving Homestead Rd., to Union Paving Co., Call Bldg., San Francisco, $23,725 and $7,110 respectively.

Colorado—State Hy. Dpt., Denver, gravel surfacing 3.3 mi. road in Saguache Co., to H. C. Lallier Constr. Co., 1657 Larimer St., Denver, $74,429.

Connecticut—State Hy. Dpt., J. A. Macdonald, comr., Hartford, trap rock waterbound macadam paving 13,650 ft. hy. Suffield, to Lane Constr. Co., 37 Colony St., Meriden—gravel surfacing 17,900 ft. Brooklyn, to F. D. Miller, Poquetanuck St., Norwich—31,320 ft. Redding, to S. M. Hull, Fairfield—15,933 ft. Harwinton, to J. DeMichiel & Bros., 58 High St., Torrington—35,450 ft. Killingly, to A. Brazos & Sons, Inc., 56 Oak St., Middletown—11,382 ft. Middlebury, to D. M. Carroll, Naugatuck—39,140 ft. Union, to Wood & Zetterman, New Britain—11,077 ft. Morris, to J. Fabbri, Bantam—9,850 ft. Wallingford, to Town of Wallingford. Est. exceeds $25,000.

Georgia—State Hy. Dpt., J. W. Barnett, hy. engr., East Point, to Davis Constr. Co., Rhodes Haverty Bldg., Atlanta, concrete paving, widening 1 bridge, 5.362 mi. Avondale-Covington Rd., DeKalb Co., $106,779; concrete paving 7.785 mi. Statesboro-Savannah Rd., Bulloch Co., $176,799; 6.773 mi. Quitman-Moultrie Rd., Brooks Co., $123,502—to J. B. McCrary Co., Citizens & Southern Bank Bldg., Atlanta, 4.765 mi. Thomasville-Moultrie Rd., Colquitt Co., $80,526; concrete paving and 1 bridge 5.7 mi. Cedartown-Atlanta Rd., Polk Co., $124,225—to Hooper Constr. Co., Bunnell, Fla., grading, paving 4.51 mi. Quitman-Moultrie Rd., Brooks Co., $21,938—to C. G. Kershaw, Woodward Bldg., Birmingham, Ala., grading 10.587 mi. Ellville-Butler Rd., Taylor Co., $57,898. Grand total $691,667. Noted Sept. 17.

Georgia—J. W. Barnett, East Point, engr., asphalt paving 7.22 mi. Lowndes Co., to S. E. Finley, 292 North Ave., N. 20, Atlanta, $35,523—14.71 mi., Bryan and Liberty Counties, and 1.32 mi. Atlanta-Marietta Hy., to W. P. McDonald Constr. Co., 884 Glenwood Ave., S.E., Atlanta, $95,358 and $14,609 respectively. Grand total $145,490. Noted Aug. 6.

Idaho—A. Harbor, comr. P. Wks., Boise, grading, gravel surfacing 18.249 mi. Idaho-Montana Hy., Jefferson Co., to Robinson Constr. Co., Twin Falls, $31,069. Est. $35,989.

Idaho—State Hy. Dpt., Salt Lake City, grading, drainage structures, 7 concrete bridges on Yellowstone Park Hy. between St. Anthony and Westover, Fremont Co., to J. A. Tertelinger & Sons Co., Spokane, Wash., $71,925. Est. $97,550.

Ill., Galesburg—Bd. Local Impvts., City Hall, grading, curbing, guttering, paving 3 blocks East Losey St., 36 ft., to H. H. Gunther Constr. Co., 600 East Main St., $23,646. Est. $25,000. State furnishes sufficient cement for 18 ft. and pays construction of 18 ft. roadway.

Ill., Marion—Williamson Co., concrete paving 2.4624 mi. county road system, 16 and 17 ft., to Egyptian Constr. Co., Herrin.

Ind., Indianapolis—Bd. P. Wks., City Hall, widening, grading, concrete paving 2,332 ft. 16th St. from Delaware to Illinois Sts., 54 ft., to Union Asphalt Paving Co., 939 East Vermont St., $24,015. Est. $35,068.

Ind., Indianapolis—Bd. P. Wks., City Hall, widening concrete paving College Ave. from Massachusetts to Indiana Asphalt Paving Co., 2810 Columbia Ave., $21,873, est. $26,666; concrete repaving Speedway Ave. from Indiana Ave. to 16th St., to Mead Constr. Co., 1027 Lemcke Bldg., $9,277; est. $11,077.

Ia., Denison—Crawford Co., grading 5.49 mi. local roads, to G. W. Condon Co., 223 Grain Exch. Bldg., Omaha, Neb., $13,101.

Kentucky—State Hy. Dpt., Frankfort, grading, drainage structures, using 1st class rein.-con. pipe 3.378 mi. Dixon-Henderson Rd., Webster Co., to E. Hardy & Son, Pulaski, Tenn., $18,569. Noted Aug. 6.

La., Bunkie—City Council, concrete paving 2 mi., to Forcum-James Co., Dyersburg, Tenn., $30,000.

Me., Portland—Dpt. P. Wks., recut granite block, paving 6,275 sq.yd. Commercial St., to B. Bucci, Portland, $17,955. Est. $25,000.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, concrete paving 0.38 mi. Contr. TO40-211, Talbot Co., to Philips Bros., Salisbury, $8,435; concrete shoulders 0.98 mi. Contr. M-184-311, Montgomery Co., to Loomis Contg. Co., 1010 Wisconsin Ave. N. W., Wash., D. C., $5,124. Noted Sept. 17.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, sheet asphalt paving 0.22 mi. Contr. BC-109-72, Baltimore Co., to National Paving & Contg. Co., Menlo Dr. and Western Maryland R.R., Baltimore, $21,594—concrete paving 1.36 Contr. T-44-24, Talbot Co., to Philips Bros., Salisbury, $27,241—macadam paving 0.84 mi. Contr. W-100-62, Washington Co., to Bester Leng Co., Hagerstown, $14,373. Grand total $63,208. Noted Sept. 10.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, gravel surfacing 2.53 mi. Contr. Sm-86-82, St. Marys Co., to Pembroke & Gasparovic, Park Hall, $17,239. Noted Sept. 3.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, concrete paving 2.02 mi. Contr. B-188-44, Baltimore Co., to G. & L. Contg. Co., Maple Ave., Overlea, Baltimore, $35,656. Noted July 9.

Maryland—State Roads Comn., G. C. Uhl, chn., Baltimore, gravel surfacing 2.67 mi. Contr. Co-102-22, Cecil Co., to Jarboe & Hamilton, Mechanicsville $23,462. Noted July 2.

Massachusetts—Dpt. P. Wks., A. W. Dean, engr., Boston, bituminous macadam paving, incl. rein.-con. bridge, 246 ft. Lynnfield and Wakefield, to J. E. Ballentine & Sons, 79 Sudbury St., Boston, $3,774—gravel and bituminous macadam paving, incl. extending 3 stone arch bridges, 1,780 ft. Townsend, to P. J. Keating Co., 107 Kimball St., Fitchburg, $34,667—bituminous macadam paving—3,730 ft. Saugus, to Mozavero-Merrill Co., Inc. 6 Dane St., Peabody, $22,324—3,500 ft. Pelham, to Kelleher Corp., Turners Falls, $11,252—3,614 ft. Medway and rein.-con. paving 4,067 ft. Randolph to Arute Bros., 513 South Main St., New Britain, Conn., $15,094 and $51,027, respectively. Grand total $138,200. Noted Sept. 10.

Massachusetts—Dpt. P. Wks., A. W. Dean, engr., State House, Boston, rein.-con. paving 112,923 ft. hy., incl. 2 span through plate girder, 3 span deck plate girder and 1 span deck plate girder bridges, Millbury and Worcester, to A. J. Savin, 408 Main St., Hartford, Conn., $412,145. Noted Sept. 3.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., bitulithic paving Park St., West Roxbury, Ward 20, to J. A. Singarella, 72 Tremlett St., Dorchester, $34,915. Noted Sept. 17.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., bitulithic paving Temple St., West Roxbury, to B. Faletra, 26 Overton St., West Roxbury, $31,990.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., bitulithic paving Searle Rd., West Roxbury, to L. J. Nawn, Inc., 149 Magazine St., Roxbury. Est. $25,000. Noted Sept. 17.

Mass., Boston—Dpt. P. Wks., J. A. Rourke, comr., sheet asphalt paving Dorchester Ave., Wards 7 and 13, to M. F. Gaddis, 6 Beacon St., $68,008. Noted Sept. 14. Daily.

Mass., Lowell—Tar and concrete sidewalks throughout various streets in city, to J. J. Walsh & Sons, 155 Highland Ave. and E. A. and A. T. Smith, 226 Merrimack St. Est. $25,000 or more.

Mass., Lynn—Grading, sidewalks, part of widening City Hall Sq., to J. W. Sheehan, 30 Bickerton St., Est. $25,000 or more.

Mass., Milton—Metropolitan Dist. Comn., 20 Somerset St., Boston, bituminous macadam resurfacing Brook and Reedsdale Rds., Blue Hills Parkway, to Coleman Bros., 245 State St., Boston, $59,932.

Michigan—A. L. Burridge, div. engr., Cadillac, grading, shaping, drainage structures, 2 course gravel surfacing 1.66[illegible] mi. FO4-14, Contr. 1, Alpena Co., 21 ft. for State Hy. Dpt., Lansing, to Maurer Bros., Cadillac, $22,227.

Mo., Clayton—St. Louis Co., Court House, rein-con. paving 7,800 sq.yd. Jackson Ave., to Skrainka Constr. Co., Security Bldg., St. Louis, $21,330—5,200 sq.yd. Laclede Station Rd., to Carlin Constr. Co., 3516 Greenwood St., Maplewood, $15,301—24,000 sq.yd. South Hway., to Eyermann Contg. Co., 1210 South Grand Blvd., St. Louis, $56,518—4,850 sq.yd. Rock Hill Rd., to W. A. Riley Constr. Co., 6221 Olive Blvd., University City $14,496. Grand total $107,645.

Mo., St. Louis—Bd. P. Wks., City Hall, grading, concrete paving alleys in City Blocks 991, 2653, 2682, and 5838, to Eyermann Cont. Co., 210 South Grand Blvd., $10,361; in City Blocks 2747, 2838, 5771, 5815, 5826M and 5916 to Creech Constr. Co., 4150 Bingham Ave., $8,640—in City Block 3024 and 5625, to Skrainka Constr. Co., Security Bldg., $7,335—in City Blocks 3978 and 5276, to W. A. Riley Constr. Co., 6221 Olive Blvd., $7,760—in City Blocks 4257, 4573 and 6061, to Stiers Bros. Constr. Co., 2944 Magazine St., $9,255—drainage gutter in front part concrete apron at St. Louis Municipal Airport, Bridgeton, to Hogan Contg. Co., 2915 Allen Ave., $4,243. Grand total $47,583. Noted Aug. 20.

N. J., Flemington—Hunterdon Co., Court House, paving 1.89 mi. Milford-Warren Glen Rd. and 1,600 ft. Milford-Frenchtown Rd., to C. Sebolt, Inc., New Brunswick, $54,218, and $10,524 respectively—0.93 mi. Milford-Mount Pleasant Rd., to Thompson & Drumm, $12,343. Grand total $77,085.

N. Y., Long Island City—G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., to Pomonok Asphalt Paving Co., 1246 Grand St., Brooklyn, asphalt paving 83rd St., $13,886—to Sprague Constr. Co., Alameda Belle Harbor, Rockaway Blvd, $24,826—to Carbloc Paving Co., Stagg St., Brooklyn, 86th St. $4,775; 43rd St. $15,460; 80th St. $6,972—to Highway Improv. Co., Furmans Island, Brooklyn, 127th St. $7,392—to Leonard Paving Co., 233 Bway., New York, grading 39th Ave., $20,693—to Borough Asphalt Co., 1301 Metropolitan Ave., Brooklyn 148th St. $5,658—to M. Cafazzo, 1043 36th St., Brooklyn, 200th St. $1,582—to Standard Dredging Co., 233 Bway., New York, grading Nassau Blvd., $343,155. Grand total $444,398.

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Streets and Roads (Continued)

Ohio—O. W. Merrell, dir. hys., Columbus, tar macadam paving 0.331 mi. Ashland Co., to Uncapher & Gillespie, Marion, $3,545—0.579 mi. Licking Co., to Federal Asphalt Paving Co., Hamilton, $12,588—0.286 mi. Lucas Co., to P. R. Creager, Liberty Center, $4,279—brick paving, using present brick on concrete base 1.13 mi. Ashland and Huron Counties, and brick paving incl. furnishing and delivering brick 0.44 mi. Erie Co., to Peters Bros., 729 Ewing St., Toledo, $40,725 and $29,712 respectively—brick paving 0.128 mi. Muskingum Co., to Adams Bros. Constr. Co., Zanesville, $4,720—concrete paving 0.701 mi. Defiance Co., to L. L. Clymer, Bluffton, $15,062—0.551 mi. Montgomery Co., to Churchill Constr. Co., Lima, $37,677—widening, bituminous concrete resurfacing 6.122 mi. Franklin Co., to Cleveland Trinidad Paving Co., Grand Theatre Bldg., Columbus, $57,089—bituminous macadam paving 0.379 mi. Holmes Co., to H. Strodtbeck, Mt. Vernon, $5,166—0.23 mi. Trumbull Co., to J. L. Sharp & Co., Parkman, $12,698. Grand total $223,261. Noted Sept. 17.

O., Cincinnati — Granite curbing, guttering, cement sidewalks, concrete paving 6,000 sq.yd. Queen City Ave., to A. J. Henkel Constr. Co., 604 Vine St., $29,813. Est. $35,881.

O., Cincinnati—City, C. A. Dykstra, mgr., concrete curbing, guttering, cement sidewalks, grading, concrete paving 12,200 sq.yd. North Bend Rd., to A. J. Henkel, 604 Vine St., $47,691. Est. $61,589.

O., Shaker Heights — Resurfacing Morley, Kingsley, Montgomery and Malvern Rds., to Cleveland Trinidad Paving Co., Western Reserve Bldg., Cleveland, $30,200.

O., Zanesville — Asphalt resurfacing Maple Ave., to Swartz & Burns Constr. Co., Zanesville, $29,325. Est. $35,000; Brighton Blvd., to Dunzweiler Constr. Co., Zanesville, $33,977. Est. $40,000.

Ore., Portland—City Comn., City Hall, widening 47 blocks Hawthorne Ave., to Jacobsen Jenson Co., Portland, $64,143. Est. $72,240.

Pa., Houston—J. G. Gantz, boro secy., grading, integral curbing, rein.-con. paving 8,000 sq.yd., brick on sand and cement paving 1,450 sq.yd., bituminous surface course paving 5,600 sq.yd. Pike St., to McCrady Constr. Co., Investment Bldg., Pittsburgh, $25,454. Noted Sept. 3.

Pa., Oil City—C. S. Hetrick, city clk., City Bldg., curbing, guttering, grading, rein.-con. paving 6,160 sq.yd. Plummer St. from Park Rd. to city limits, to L. Shreck, Oil City. Noted Sept. 10.

Tenn., Memphis—To Carey-Reed Paving Co., 575 North Front St., integral curbing, concrete paving 7,500 sq.yd. Dunnavant St., $14,893; 5,000 sq.yd. Keel Ave., $10,209; asphalt paving 5,760 sq.yd. Lamar Ave., $13,811. Grand total $38,913.

Tex., Waco—McLennan Co., 8 in. gravel surfacing 48 mi. roads, 18 ft., to W. McKethan, Waco, $44,250.

Virginia—State Hy. Dpt., Richmond, improving Girard St., Danville, Route 13, to C. A. Ragland, Louisburg, N. C., $41,767—Route 18.2 mi. south of Clifford to Amherst, to N. Tver, Durham, N. C., $48,232—Route 10, 3.7 mi. west of Rose Hill, to Tazewell Constr. Co., Richlands, $56,925—9.6 mi. Route 52 from Sussex Co. Line to Petersburg south city limits, to Bakersville & Hawkins, McKenny, $19,482—Route 37, from Oak Grove to Kings Co. Line, to Perkins-Barnes Constr. Co., Blackstone, $27,762. Grand total $194,167.

Va., Norfolk—City Council, paving streets affected by tearing up street car tracks for bus lines, incl. Reeves Ave. and Front St., to F. J. McGuire Co., Norfolk. Est. $60,511.

Washington—State Hy. Dpt., Olympia, clearing, grubbing, grading 4.964 mi. road in Grays Harbor Co., to L. Colluccio & Co., 1638 Lane St., Seattle, $67,966—4.694 mi. Kittitas and Yakima Counties, to T. Marrazzo, Banks, Idaho, $50,446—crushed stone surfacing—17.75 mi. Clallam Co., to F. G. Redmon, 206 South 4th St., Yakima, $11,266 — 6.969 mi. King and Pierce Counties, to Edlefsen Weygandt Co., 280 Front St., Portland, Ore., $146,980. Grand total $276,658. Noted Sept. 3.

Wash., Seattle—Bd. P. Wks., paving Ann Arbor Ave., et al, to Argentieri & Colorossi, 1819 Weller St., $29,305.

British Columbia—Government of British Columbia will build 18 mi. hy. for new entrance of Pacific Hy. to Vancouver, via new bridge at Lodner from Douglas and Blaine at Mt. Boundary, day labor, $350,000. P. Philip, Dpt. P. Wks., Victoria, engr.

Ont., Ottawa—Curbing, guttering, asphalt on concrete paving Rideau St. from Nelson to Charlotte Sts., to Standard Paving Co., Ltd., Elgin St., $64,481.

Ont., Ottawa—Guttering, curbing, asphalt on concrete paving Beechwood Ave. from Springfield Rd. to Butternut Ave., to Grant Bros. Contg. Co., 354 Bank St., $35,872.

Quebec—Provincial Govt., Quebec, bituminous concrete paving Hull-Maniwaki Hy., Hull Co., and straightening curve; same hy. in Hull West, to Hull & Gatineau Constr. Co., 187 Principale St., Hull, $19,425 and $9,869 respectively.

Que., Hull—Paving Montcalme St., to Standard Paving Ltd., Central Chambers, Ottawa, Ont., $31,653.

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EXCAVATION, DRAINAGE, IRRIGATION, LEVEES, RIVER AND HARBOR

PROPOSED WORK

Arizona—Maricopa Co. (Phoenix), Southern Pacific R.R. Co., G. W. Boschke, ch. engr., San Francisco, Calif., Atchison, Topeka & Santa Fe R.R. Co., G. W. Harris, ch. engr., 80 East Jackson Blvd., Chicago, Ill., Salt River Valley Water Users Assn., and Roosevelt Irrigation Dist. flood control on New and Agua Fria Rivers, Maricopa Co. $35,000.

California—Riverside Bd. Pub. Utilities, Riverside, appropriated $10,000, Bd. Supervs. Riverside Co., Riverside, $30,000, Bd. Supervs. San Bernardino Co., San Bernardino, $20,000, Bd. Supervs. Orange Co., Santa Ana, $10,000, flood control work along Santa Ana River, incl. check dams and spreading dams along river for water conservation and flood control work, in San Bernardino, Riverside and Orange Counties.

Calif., Santa Monica—H. B. Carter, city engr. will design and supervise construction 2,000 ft. rein.-con. crib type breakwater, each crib to be 100 ft. long, 33 ft. wide at bottom, 23 ft. wide at top, 41 ft. high, to weigh 1,700 tons each, to be built on shore, towed into water, sunk in place, filled with sand, rein.-con. superstructure to be rein.-con. with promenade, also steps on ocean side, weighing 120,000 tons, making load of 6,000 tons in each crib, to incl. 24,000 tons stone, 22,000 cu.yd. concrete, 1,100 tons reinforcing steel, 50,000 cu.yd. sand fill; the breakwater will be connected to municipal pier with 200 ft. suspension bridge with two 200 ft. approaches, 30 ft. clearance at mean high water, incl. 45 tons structural steel, 750 tons rein.-con., 1,200 lin.ft. piling, also ornamental lighting system, moorings for small crafts, incidental features, for City. $690,000. Noted Sept. 24.

Mass., Barnstable—E. S. Davis, Centreville, timber pier and fill solid, Centerville River, $25,000.

Mass., Charlestown (sta. Boston) — City of Boston, Park Dpt., concrete retaining wall, Dewey Beach, $25,000 or more.

BIDS ASKED

Calif., Long Beach—City Council taking bids 95,000 cu.yd. excav. in connection with 6 steel tanks on Alamitos Hill, for Municipal Water Dpt.

Calif., Ventura—Oct. 20, by Bd. Supervs. Ventura Co., L. E. Hallowell, clk., excavation and lining with concrete storm water ditch, incl. 1,000 cu.yd. excav. and embankment, 108 cu.yd. A structural concrete, 4,400 lb. reinforcing steel, 1,260 ft. b.m. lumber, installing 136 ft. 36 in. metal pipe.

La., East Point—Oct. 21, by Bd. State Engineers, 207 New Orleans Court Bldg., New Orleans, improving East Point New Levee of left bank Red River in 19th Louisiana Levee Dist., Red River Parish, near here, 3,300 ft. long, 8 ft. high, incl. 55,000 cu.yd. excav.

La., New Orleans—Oct. 9, by State Bd. Engineers, constructing Montgomery Ferry South New Levee, 19th Louisiana Levee Dist., 30,600 ft. long, incl. 170,000 cu.yd. excav., on West Bank Red River, Natchitoches Parish; Sample-Wesdale new levee in Red River-Bayou Pierre Levee and Drainage Dist., 23,811 ft. long, 108,000 cu.yd. excav., on west bank Red River.

Miss., Jackson—Oct. 13, by State Hy. Comn., Tower Bldg., Jackson, 381,134 cu.yd. hydraulic settlement fills by pressure jetting on Federal Aid Project 184-F, Warren Co.

Tex., Waco—Oct. 14, by W. C. Cobb, aud. McLennan Co., excavating 3.69 mi. drainage channel, 203,000 cu.yd. earth excav. M. Hannah, Waco, co. engr.

Que., Matane—Oct. 13, by N. Desjardins, secy. Dpt. P. Wks., Ottawa, Ont., extending West Breakwater. $25,000.

CONTRACTS AWARDED

La., Cameron—Bd. Levee Comrs. Gravity D. D. 3, main drainage canals, laterals, incl. $160,000 cu.yd. excav., to Lake Arthur Dredging Co., Beaumont, Tex., at $0.0545 per cu.yd. Noted Sept. 17.

Wash., Walla Walla—City Comrs. bulkhead on south side Mill Creek to G. Harding, Walla Walla, $25,158.

N. S., Liverpool—Dredging, to Beacon Dredging Co., Ltd. Halifax, $26,885.

Ont., Oshawa—N. Desjardins, secy. Dpt. P. Wks., Ottawa, 375 lin.ft. sea-wall, to T. A. Broun Co. Ltd., 1121 Bay St., Toronto, $34,039. Noted Aug. 27.

Bond Elections

Coming Bond Elections

Pipe Lines, Reservoirs — Santa Barbara, Calif., $301,000.

Cast Iron Water Pipe Line—Vernal, Utah, Nov. 3, $50,000.

Filter Plant—Pryor, Okla., Oct. 8, $25,000. Long & Co., 1300 Colcord Bldg., Oklahoma City, engrs.

Light Plant—Pryor, Okla., Oct. 8, $75,000. Long & Co., 1300 Colcord Bldg., Oklahoma City, engrs.

Bonds Voted

Channel Impvts.—Sacramento, Calif., Amer. River Flood Control Dist., $565,000.

Bonds Defeated

Waterworks—Clayton, Kan., $18,000.

FEDERAL GOVERNMENT

PROPOSED WORK

Ala., Mobile—HOSPITAL—Treas. Dpt. at office Sup. Archt. plans by Warren, Knight & Davis, Protective Life Bldg., Birmingham, and C. G. Yonge, Merchants Natl. Bldg., Mobile, assoc. archts., and bids about Nov. 15, general contract extending, remodeling main building U. S. Marine Hospital. $450,000.

Ariz., Mesa—FEDERAL BUILDING—Treas. Dpt. at office Sup. Archt., sketches U. S. Federal building. $90,000.

Ariz., Nogales—IMMIGRATION STATION—Dpt. Internal Revenue, Treas. Dpt. at office Sup. Archt., immigration station. $150,000.

Calif., San Francisco—MESS HALL, etc.—Con. Q. M., 2 story mess hall $75,000, 2 story ward addition $55,000, 3 story nurses' home addition $70,000, all foregoing rein.-con., 10 sets hollow tile double officers' quarters, $120,000, at Letterman General Hospital, San Francisco, Presidio.

Conn., Derby—POST OFFICE—Treas. Dpt. at office Sup. Archt., brick, stone post office. $125,000. J. A. Wetmore, c/o owner, archt.

Conn., New London—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by Payne & Keefe, 231 State St., 1 story, basement, 160 x 215 ft., brick, stone post office. $420,000. Noted Aug. 19.

Ill., Hillsboro—POST OFFICE—Treas. Dpt. at office Sup. Archt., soon takes bids rein.-con., brick, steel. $75,000. Noted May 14.

Louisiana—DREDGING—U. S. Eng., Prytania St., New Orleans, 6,554,000 cu.yd. from Louisiana-Texas Intracoastal Waterway, Miss. River, Atchafalaya River Sect. from Harvey to Bayou Blue.

La., Shreveport—ROAD SYSTEM—Con. Q. M. road system at Barksdale Field Airport. $400,000.

Md., Annapolis—BUILDING—Spec. 6593—Yards & Docks, Navy Dpt., building extension at Naval Engineering Experiment Station.

Minn., St. Paul—CLEARING—U. S. Eng., 5,139 acres for pool area above Hastings Lock and Dam, in Mississippi River, between lock and dam and South St.

Miss., Aberdeen—POST OFFICE, etc.—Treas. Dpt. at office Sup. Archt., U. S. Post Office and Court House. $122,000.

Mo., Kansas City—PONTOONS, etc.—U. S. Eng., 20 pontoons and 20 sections 34 in. steel pipe.

Neb., Grand Island—POST OFFICE—Treas. Dpt. at office Sup. Archt., bids in December, altering and constructing 2 story, basement, 70 x 90 ft., brick, steel addition, 2nd and Locust Sts. $150,000. C. W. Stenbaugh, 662 Brandeis Theatre Bldg., Omaha, archt. Noted Sept. 3.

Nev., Reno—POST OFFICE—Treas. Dpt. at office Sup. Archt., bids in January, 3 story, basement, 21 Mill St. $450,000. F. J. DeLongchamps, Gazette Bldg., archt. Noted June 4.

N. J., Englewood—POST OFFICE—Treas. Dpt. at office Sup Archt., 2 story, basement, brick, steel, West St. and Fallman Pl. $200,000. **Maturity in spring.** Noted July 16.

N. J., Paterson—POST OFFICE—Treas. Dpt. at office Sup. Archt., 2 story, basement, brick, steel, Ramapo Ave., Market and Straight Sts. $500,000. **Maturity in spring.** F. W. Wentworth & F. J. Vreeland, 140 Market St., archts. Noted July 23.

N. J., Union City—POST OFFICE—Treas. Dpt. at office Sup. Archt., 2 story, basement, brick, steel, Palisade Ave and 29th St. $260,000. **Maturity in spring.** Noted Nov. 14, 1929.

N. Y., Jamaica—POST OFFICE—Treas. Dpt., U. S. Post Office, 164th St. and Sutphin Ave. $875,000. **Maturity late in winter.** Crow & Cross, 385 Madison Ave., New York, archts. Noted Sept. 17.

Okla., Ada—POST OFFICE—Treas. Dpt. at office Sup. Archt., plans by W. T. Schmitt, Hales Bldg., Oklahoma City, rein.-con., brick, stone post office. $250,000. Noted Apr. 16.

Okla., Okmulgee—POST OFFICE—Treas. Dpt. at office Sup. Archt., soon takes bids rein.-con., brick, stone 4th St. between Grand and Morton Sts. $330,000. Noted Aug. 6.

Pennsylvania—DAM—U. S. Eng., 1,500 ft. fixed dam, creating 18 mi. pool, two locks, at Montgomery Island. $6,00,000. W. D. Styes, Kennan Bldg., Pittsburgh, engr.

Wis., Sheboygan—POST OFFICE—Treas. Dpt. at office Sup. Archt. plans by E. A. Stubenrauch, Sheboygan, 2 story, basement, brick, steel, 9th and Center Sts. $214,000.

BIDS ASKED

Ark., Forrest City—POST OFFICE—Oct. 19, by Treas. Dpt. at office Sup. Archt., U. S. Post Office. Noted May 7.

Calif., Stockton—DREDGING—Oct. 13, by U. S. Eng., California Fruit Bldg., Sacramento, 1,289,000 cu.yd. in Stockton Channel Prism. Noted Sept. 10.

Conn., Derby—POST OFFICE—Oct. 14, by Treas. Dpt. at office Sup. Archt., brick, stone, West 4th and Olivia Sts. $150,000. Private plans. Noted Aug. 7.

D. C., Wash.—AIR COMPRESSOR—Oct. 12, by A. L. Flint, genl. purch. agt., Panama Canal, air compressor, pedestal grinders, water meters, reinforcing bars, waterproofing, cable, wire, etc., Schedule 2687.

Fla., Jacksonville—POST OFFICE, etc.—Oct. 15, by Treas. Dpt. at office Sup. Archt., U. S. Post Office, Parcel Post Building. $343,000. Noted Apr. 9.

Ill., Highland—POST OFFICE—Oct. 9, by Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Federal Government (Continued)

Ia., Albia—POST OFFICE—Oct. 16, by Treas. Dpt. at office Sup. Archt., U. S. Post Office. Noted Aug. 6.

Kan., Fort Leavenworth—HANGAR—Oct. 8, by Con. Q. M. double hangar with annexes, boiler house. $83,700. Noted Sept. 14 Daily.

Ky., Central City—POST OFFICE—Oct. 9, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E.N.-R. Oct. 1.

Ky., Elizabethtown—POST OFFICE—Oct. 13, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E. N.-R. Oct. 1.

Ky., Paintsville—POST OFFICE—Oct. 12, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E.N.-R. Oct. 1.

Mich., Detroit—POST OFFICE—Oct. 15, by Treas. Dpt. at office Sup. Archt., U. S. Post Office. Noted Sept. 4.

Mich., Mount Clemons—DISTRIBUTION SYSTEM—Oct. 14, by Con. Q. M. Selfridge Field, underground electric distribution system, incl. 3 exterior and 2 interior transformer vaults, primary and secondary cables, break-water beacon, lighting and street lighting system, at Selfridge Field. $25,000.

Mississippi—LEVEE—Oct. 8, by U. S. Eng., Memphis, Tenn., 75,000 cu.yd. earthwork in Upper Yazoo Levee Dist., will restore sunken levee in portion new loop, at Moons, about 5 mi. west of Tunica, Yazoo Levee Dist.

Mo., Mountain Grove—POST OFFICE—Treas. Dpt. at office Sup. Archt., taking bids Oct. 9, 1 story, basement, brick, stone, rein.-con., U. S. Post Office. $70,000.

N Y., Medina—POST OFFICE—Oct. 14, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E. N.-R. Oct. 1.

N. Y., Mineola—QUARTERS—Oct. 9, by U. S. Eng., non-commissioned officers quarters, Mitchel Field. $300,000.

O., Niles—POST OFFICE—Oct. 15, by Treas. Dpt. at office Sup. Archt., U. S. Post Office.

Pa., Phila., DREDGING SLEEVES—Oct. 6, by U. S. Eng., 800 rubber dredging sleeves 22 in. diam, 27 dredging sleeves 25½ in. diam.

Tex., Georgetown—POST OFFICE—Oct. 16, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E.N.-R. Oct. 1.

Tex., Memphis—POST OFFICE—Oct. 20, by Treas. Dpt. at office Sup. Archt., brick post office. $69,600.

Wash., American Lake—HOSPITAL—Oct. 20, by Vet. Bureau, Arlington Bldg., complete hospital buildings at U. S. Veterans Hospital.

Wash., Pasco—POST OFFICE—Nov. 2, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E.N.-R. Oct. 1.

W. Va., Elkins—POST OFFICE—Oct. 14, by Treas. Dpt. at Office Sup. Archt., U. S. Post Office; adv. E.N.-R. Oct. 1.

W Va., New Martinsville—POST OFFICE—Oct. 21, by Treas. Dpt. at office Sup. Archt., U. S. Post Office; adv. E. N.-R. Oct. 1

W. Va., Marmet—LOCKS, etc.—Oct. 23, by U. S. Eng., Huntington, constructing 2nd of 2 locks, powerhouse building, and connection to old dam at Marmet, on Great Kanawha River, 9 mi. above Charleston; adv. E.N.-R., Oct. 1. Noted Sept. 24.

Wis., South Milwaukee—POST OFFICE—Oct. 19, by Treas. Dpt. at office Sup. Archt., U. S. Post Office.

CONTRACTS AWARDED

Ala., Montgomery—BOILER PLANTS—Con. Q. M. Maxwell Field, 2 boiler plants, outside distribution system and steam conduit drains, to L. Gertner, Jr., Chicago, Ill., $44,990. Noted July 30.

Ala., Montgomery—RADIO BUILDING—Con. Q. M. Maxwell Field, radio building, to A. Blair, 1st Natl. Bank Bldg., $3,560. Noted Aug. 27.

Ark., Texarkana—POST OFFICE—Treas. Dpt. at office Sup. Archt., clearing site for U. S. Post Office, to Daley & Bickley, Texarkana, $3,275. Noted Apr. 9.

Conn., Hartford—POST OFFICE—Treas. Dpt. at office Sup. Archt., 3 story, basement, brick, steel, post office, to Coath & Goss, 1109 South State St., Chicago, Ill., $903,225; elevator, to Otis Elevator Co., 810 18th St., Wash., D. C., $52,574. Noted Aug. 20.

D. C., Wash. — FEDERAL WAREHOUSE — Public Buildings & Public Parks, Navy Bldg., 7 story, basement, 212 x 252 ft. rein.-con., to B-W Constr. Co., 720 North Wabash St., Chicago, Ill., $1,015,000. Noted Aug. 6.

D. C., Wash. — PAVING — Executive Officer Memorial Bridge Comn., Navy Bldg., granite block paving 14,500 sq.yd. Arlington Memorial Bridge over Potomac River, to Union Paving Co., 1626 Arch St., Phila., Pa., $40,828, short bridge across Boundary Channel leading to Virginia shore. Noted Aug. 27.

Idaho—EARTHWORK—Dpt. Interior, Bureau Reclamation, Burley earthwork and structures on Milner-Gooding Canal and enlargement north Gooding Canal, to Haas, Daughty & Jones, Spokane, Wash., $117,800. Noted Aug. 13.

Ind., Noblesville—POST OFFICE—Treas. Dpt. at office Sup. Archt., 1 story, basement, 75 x 85 ft. rein.-con., to LaSalle Constr. Co., South Bend. Noted Sept. 10.

Kan., Topeka—FOUNDATIONS—Treas. Dpt. at Office Sup. Archt., founds. for U. S. Post Office, to H. W. Underhill Constr. Co., Wichita, $12,500. Noted Sept. 10.

Ky., Lexington—RECREATION—Vet. Bureau, Arlington Bldg., additional buildings to J. A. Holpuch Co., 4010 West Madison St., Chicago, Ill., $98,000. Noted Aug. 20.

La., Shreveport—HANGARS, etc.—Con. Q. M., 4 double hangars, operations building, assembly shop, 1 warehouse Barksdale Field, to W. M. Werner, Shreveport, $375,000. Noted Sept. 3.

Mass., Camp Devons—ROADS—Con. Q. M. bituminous macadam paving roads, to Guaranty Constr. Co., 161 Harvard Ave., Brighton, at $1.20; waterbound macadam paving, to G. H. Pierce, Groton, $1.01; sidewalks, to H. W. Winslow, Ayer, $0.15. Noted Sept. 10 Daily.

Mo., Kansas City—WIRE STRAND—U. S. Eng., 707 Postal Telegraph Bldg., 210,000 ft. 3/8 in. wire strand, to Amer. Steel & Wire Co., 147 Grand Ave., Kansas City, $1,859; 150,000 ft. ½ in. wire strand, to Sheffield Steel Corp., Sheffield Station, Kansas City, $1,306.

Mo., Caruthersville—POST OFFICE—Treas. Dpt. at office Sup. Archt., 2 story, basement, brick, steel, to C. H. Barnes, Logansport, Ind., $64,200. Est. 80,000. Noted Aug. 20.

Mo., St. Louis—REVETMENT—U. S. Eng., 428 Custom House, to M. A. Wogan, 511 Railway Exch. Bldg., 3,500 ft. revetment in Missouri River at Dozier Bend, $51,060; to W. P. McGeorge, Pine Bluff, Ark., 3,000 to 6,000 ft. in Mississippi River, Chesley Island $59,620, 2,000 to 4,000 ft. at Cornice Island $38,737, 2,500 to 4,500 ft. at Brunkhorst $46,426; to Massman & Peterson, St. Louis, 1,500 to 3,000 ft. Little Flora Creek, $25,876; to Badgett Constr. Co., Memphis, Tenn., 4,000 to 12,000 ft. in Mississippi River at Cape Girardeau, $104,097; to Bilhorn, Bower & Peters, Inc., Railway Exch. Bldg., 1,500 to 3,000 ft. Buffalo Island, $28,926. Grand total $354,742. Noted Sept. 3.

Mo., St. Louis—FEDERAL BUILDING—Treas. Dpt. at office Sup. Archt., clearing site for federal court house, custom house, 12th Blvd. and Market St., to Amer. Wrecking Co., 3800 Milwaukee Ave., Chicago, Ill., $1,655. Noted Aug. 26 Daily.

N. C., Lumberton—POST OFFICE—Treas. Dpt. at office Sup. Archt., U. S. Post Office, to J. McCarthy & Sons, Pana, Ill., $70,200. Noted Sept. 3.

N. C., Oteen—BOILER HOUSE, etc.—Vet. Bureau, Arlington Bldg., boiler house and chimney, to J. M. Geary Co., Asheville, $134,000. Noted Aug. 6.

Oregon — BRIDGE — Pub. Rds., Portland, bridge in Umatilla Co., to Union Bridge Co., Porter Bldg., Portland, $54,682. Noted Sept. 3.

Ore., Portland—DIKES—U. S. Eng., Portland 1,960 ft. pile dikes in Columbia River, to Kern & Kibbe, 290 East Salmon St., $31,780. Noted Sept. 3.

Tenn., Memphis — PONTOONS, etc. — U. S. Eng., 12 pontoons, to St. Louis Structural Steel Co., East St. Louis, Ill., $18,400; 14 sections 32 in. dredge pipe, to Chicago Bridge & Iron Wks., Birmingham, Ala., $3,986. Noted Sept. 3.

Tex., Randolph Field—FUELING SYSTEM, etc.—Con. Q. M., gasoline fueling system, incl. installing equipment to move gasoline from 2 main underground storage tanks near hangar line and from these tanks to delivery points along flying line to Aqua Systems, Inc., 2 Lafayette St., New York, $47,968; concreting around hangar, to Amisite Co., c/o Capt. A. W. Parker, San Antonio, $215,000. Noted Sept. 24.

Vt., Derby Line—INSPECTION STATION—Treas. Dpt. at office Sup. Archt., inspection station, Main St., to E. E. Garber & Co., Bethlehem, Pa., $54,000. Noted Aug. 27.

Wash., Metaline Falls—INSPECTION STATION—Treas. Dpt. at office Sup. Archt., inspection station, to Johnson Bros., 1716 East 52nd St., Seattle, $42,605. Noted Aug. 13.

Wash., Seattle — CRANES — Spec. 6482 — Yards & Docks, Navy Dpt., 250 ton hammerhead type crane, to Dravo Contg. Co., 30th and Market Sts., Pittsburgh, Pa., $479,000; 20 ton jib type crane, to R. W. Kaltenbach Corp., Bedford, O., $55,000; 10 ton gantry crane, to Star Iron & Steel Co., 435 East 11th St., Tacoma, $53,400. Grand total $587,400. Noted May 7.

Wyo., Moran—RESERVOIR SITE—Bureau Reclamation, Denver, Colo., clearing 700 acres of Jackson Lake Reservoir site, to Fullen Constr. Co., Gering, Neb. $58,800.

RAILWAYS

BIDS ASKED

Colorado—Denver & Rio Grande Western R.R. Co., Equitable Bldg., Denver, A. O. Ridgway, ch. engr., bids about Oct. 1 (extended date) constructing 42 mi. Dotsero Cut-Off between Orestod and Dotsero. $3,500,000. Noted Aug. 20.

CONTRACTS AWARDED

Nevada—Six Companies, Inc., Boulder City, 16 mi. track-laying on railroad being built as auxiliary to construction Hoover Dam, Hoover Dam site, to Shannahan Bros., Inc., 406 South Main St., Los Angeles, Calif.

Texas—Waco, Beaumont, Trinity & Sabine Ry. Co., P. G. Burns, San Antonio, ch. engr., 60 mi. trackage to serve Port Neches, Texas, and Texas & Gulf Oil companies, to H. K. Johnson, Port Arthur, $360,000. Est. $500,000.

SUBWAYS AND TUNNELS

PROPOSED WORK

Calif., Fresno—City and Southern Pacific R.R. Co., 65 Market St., San Francisco, G. N. Boschke, ch. engr., surveys Belmont Avenue Subway, rein.-con. $210,000. J. L. Vincenz, city engr.

GRADE CROSSINGS

PROPOSED WORK

N. J., Atlantic City—Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta., Phila., Pa. and Central R.R. of New Jersey, A. E. Owens, ch. engr., Jersey City, 12 grade crossing eliminations, near here. To exceed $1,000,000.

N. J., Bogota—West Shore R.R. Co., c/o New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, grade crossing, Fort Lee Rd. To exceed $25,000.

N. J., Elberon—New York & Long Branch R.R. Co., A. E. Owens, ch. engr., Jersey City, eliminating grade crossing at Lincoln Ave. To exceed $100,000.

N. J., Elizabeth—Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta., Phila., Pa., and Central R.R. of New Jersey, A. E. Owen, ch. engr., Jersey City, eliminating 21 grade crossings at various locations, near here. To exceed $1,000,000.

N. J., Lodi—Erie R.R. Co., G. S. Fanning, ch. engr., 101 Prospect Ave., Cleveland, O., eliminating grade crossing, Main St. To exceed $100,000.

N. J., New Providence—Delaware, Lackawanna & Western R.R. Co., G. J. Ray, ch. engr., Hoboken, concrete, steel overhead, grade crossing, Springfield Ave. $170,000.

N. J., Picton—Lehigh Valley R.R. Co., G. T. Hand, ch. engr., 143 Liberty St., New York, preliminary plans steel, concrete grade crossing at Central Ave. $200,000.

N. J., South Plainfield—Central R.R. of New Jersey, A. E. Owen, ch. engr., Jersey City, eliminating grade crossing at Park Ave. To exceed $100,000.

N. J., Stelton—Pennsylvania R.R. Co., T. J. Skillman, ch. engr., Broad St. Sta., Phila., Pa., grade crossing. $210,000.

N. J., West Arlington—Erie R.R. Co., G. S. Fanning, ch. engr., 101 Prospect Ave., Cleveland, O., eliminating grade crossing at Passaic Ave. To exceed $100,000.

N. Y., Port Chester—New York, New Haven & Hartford R.R. Co., E. E. Oviatt, ch. engr., New Haven, Conn., reconstructing bridge carrying Main St. over tracks, Westchester Co. $205,100.

BIDS ASKED

Ind., Huntington—Oct. 15, by Chicago & Erie R.R. Co., 101 Prospect Ave., Cleveland, O., G. S. Fleming, ch. engr., at office auditor, Huntington Co., Court House, Tipton Street Subway. $73,437.

Neb., Columbus—See "Contracts Awarded."
B. C., Trail—See "Contracts Awarded."

CONTRACTS AWARDED

Neb., Columbus—Union Pacific R.R. Co., H. C. Mann, ch. engr., 1416 Dodge St., Omaha, concrete overhead bridge for eliminating grade crossing, own forces. $320,000.

N. Y., Chateaugay—Rutland R.R. Co., L. G. Morphy, ch. engr., Rutland, Vt., reconstructing Overpass Bridge 335, 1.5 mi. from here, to Lord & Humphrey, Malone, $36,500. Noted Aug. 20.

N. Y., Davenport—Ulster & Delaware R.R. Co., E. Coykendall, pres., Kingston, eliminating grade crossing west of here, Center Station, Delaware Co., to R. E. Tompkins, Rochester, $72,758. Est. $101,235.

N. Y., Hornell—Erie R.R. Co., G. S. Fanning, ch. engr., 101 Prospect Ave., Cleveland, O., eliminating Main, Washington and Steuben Street Crossings, to Newhall Co., Terminal Tower, Cleveland, O., $100,488. Est. $186,254. Noted Aug. 19.

N. Y., Fort Plain—New York Central R.R. Co., F. B. Freeman, ch. engr., reconstructing bridge, to Walsh Constr. Co., Herald Bldg., Syracuse.

N. Y., Mapleview—New York Central R.R. Co., F. B. Freeman, ch. engr., 466 Lexington Ave., New York, eliminating grade crossing, to W. M. Ballard, Inc., City Bank Bldg., Syracuse.

B. C., Trail—Dpt. P. Wks., Victoria, 102 ft. subway, 24 ft. under Canadian Pacific Ry., Trail-Rossland Hy., day labor under unemployment scheme by Government force account. $60,000. P. Philip, Dpt. P. Wks., Victoria, engr.

DAMS

PROPOSED WORK

California—See "Excavation, Drainage, Irrigation, Levees, River and Harbor."

CONTRACTS AWARDED

La., Natchitoches—Dpt. Conservation, New Orleans, rein.-con. spillway dam across Saline Bayou, near here, to Fuller Constr. Co., 2701 Elysian Fields Ave., New Orleans, $34,488.

PIERS AND WHARVES

PROPOSED WORK

Mass., Barnstable—PIERS—C. B. Southgate, Main St., Oysterville, 2 timber piers, Centerville River. $25,000. Private plans.

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Piers and Wharves (Continued)

Miss., Gulfport—PIERS, WHARVES, etc.—City and State of Mississippi, Jackson, developing piers, wharves, slips, warehouses, other facilities. $1,000,000.

BIDS ASKED

Calif., Los Angeles—WHARF—City Harbor Dpt. taking bids 1,292 ft. timber wharf, 33 to 70 ft. wide, at Berths 145 and 146. Timber and piling will be furnished by owner.

N. B., St. Andrews—WHARF—Oct. 7, by N. Desjardins, secy. Dpt. P. Wks., Ottawa, Ont., reconstructing public wharf. $10,000.

Ont., Goderich—PIER—Oct. 6, by N. Desjardins, secy. Dpt. P. Wks., Ottawa, Ont., reconstructing in concrete superstructure outer end of North Pier, $20,000; also outer end of South Pier, $30,000.

CONTRACTS AWARDED

Ont., Kingsville—PIER—N. Desjardins, secy. Dpt. P. Wks., Ottawa, repairing East Pier, to R. C. Huffman Constr. Co. Ltd., 331 Bay St., Toronto, $19,626. Noted Aug. 27.

Quebec—WHARF DOCK—N. Desjardins, secy. Dpt. P. Wks., Ottawa, Ont., pilework protection, repairing part of wharf dock, to Ludger Lemieux Ltd., Quebec, $11,788. Noted Sept. 17.

Que., Clarke City—WHARF—N. Desjardins, secy. Dpt. P. Wks., Hunter Bldg., Ottawa, Ont., repairing wharf, to F. Belhey, G. Villeneuve and G. Lajoie, Pointe Au Pic, Quebec, $16,428.

AIRPORTS

PROPOSED WORK

La., New Orleans—Orleans Levee Bd., Camp and Common Sts., A. L. Shushan, pres., 70 x 300 ft., Shushan Airport, Administration Building, $168,000; one 22 x 120 ft. and one 12 x 300 ft. hangars, $117,774; 100 x 120 ft. repair and shop building, $29,234; emergency and storage building with fire equipment, $38,090; surfacing runways, taxiways hangar floors, and course between hangars, $109,000. Noted July 30.

BIDS ASKED

N. Y., Brooklyn—Oct. 5, by J. McKenzie, comr. Docks, Pier A, Battery Pl., rein.-con. taxi strips and fillets with gravel strips adjacent thereto, at Municipal Airport, Floyd Bennett Field. Contr. 2048.

CONTRACTS AWARDED

Ala., Mobile—City airport improvements, grading, drainage, to Hancock Co., Mobile, $20,698.

Ill., Chicago—American Airways, Inc., Universal Div., Lambert-St. Louis Field, Robertson, Mo., 120 x 165 ft., concrete, brick, steel and post hangar, 30 x 120 ft. lean-to, to Austin Co., 510 North Dearborn St. Est. $90,000.

Minn., Little Falls—State, E. A. Walsh, adjt. genl. 108 Capitol, St. Paul, and U. S. Govt. c/o Property & Disbursing Office, 1 story, concrete block, steel, brick hangar at Camp Ripley, to Northland Constr. Co., 2608 10th Ave. S., Minneapolis, $18,650.

Tex., Dallas—City, c/o E. Goforth, secy., paving runways, taxi strip and ramps at Love Field, to R. J. Estep & Co., Praetorian Bldg., $92,780.

POWER AND LIGHTING

PROPOSED WORK

Calif., Santa Monica—See "Excavation, Drainage, Irrigation, Levees, River and Harbor."

Ont., St. Thomas—See "Sewers."

BIDS ASKED

Calif., Oakland—Oct. 8, by W. W. Chappell, city clk., ornamental street lighting system, incl. 136 Duplex standards with underground system, $46,500.

CONTRACTS AWARDED

Missouri—Union Electric Light & Power Co., 12th and Locust Sts., St. Louis, 132,000 volt electric transmission line from Osage to Page Ave. Station, St. Louis, to Stone & Webster, 49 Federal St., Boston, Mass. Est. $1,000,000.

PARKS AND SPORTS

PROPOSED WORK

Mass., Beverly—Kendall Hall (School for Girls), 410 Hale St., plans by Walker & Walker, 250 Stuart St., Boston, brick gymnasium, Hale St., $25,000 or more.

Mass., Boston—City, Park Dpt., improvements at Franklin Park, incl. new water supply, $80,000 appropriated.

Mass., East Boston (sta. Boston)—City of Boston, Park Dpt., bathing beach, Condor St. $25,000.

N. Y., Brooklyn—Park Bd., W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, New York, sketches by C. D. Lay, 101 Park Ave., New York, landscaping, Marine Park. Total $40,000,000. **Maturity late in winter.** Noted May 28.

N. Y., Jamaica—Bd. Educ., 500 Park Ave., New York, bleachers athletic field, Jamaica High School, Gothic Dr. and Chapin Parkway, $200,000. W. C. Martin, Flatbush Ave. extension and Concord St., Brooklyn, archt.

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N. Y., New York—Bd. Educ., 500 Park Ave., soon take bids bleachers, field house, storage, Gunhill Rd. and Wallace Ave. $115,000. W. C. Martin, Flatbush Ave. extension and Concord St., Brooklyn, archt. Noted Sept. 17.

BIDS ASKED

N. H., Manchester—See "Contracts Awarded."

CONTRACTS AWARDED

Fla., Coral Gables (br. Miami)—Coral Gables Racing Assn., F. J. Bruen, pres., sports race track development, to G. W. Langford Co., McAllister Hotel, Miami. Est. exceeds $40,000.

Mass., Dudley—Nichols Junior Academy, Q. Merrill, 253 Main St., 1 story, brick, timber gymnasium, Dudley Hill, to F. X. Laliberte & Son, Inc., Main St., Southbridge. Est. $25,000.

N. Y., Ithaca—State, Albany, park pavilion, Lake Cayuga, Seneca Co., to M. S. Materson, 43 Clinton St., Seneca Falls, $28,586; sanitary work, to Gundell & Kulp, Inc., 199 Lyell Ave., Rochester, $2,222.

N. Y., New York—Dpt. Parks, W. R. Herrick, pres. Park Dpt., Arsenal Bldg., Central Park, improving park in New York Zoological gardens, Bronx Park, and reconstructing, paving Allerton Ave., Bronx Park and Bronx River Parkway, to C. D. Beckwith, Inc., Seneca Ave. and Edgewater Rd., $30,981 and $27,236, respectively; improving McCombs Dam Park, to Rusciano Contg. Co., 305 East Kingsbridge Rr., $95,528. Grand total $153,745. Noted Sept. 3.

HEATING AND VENTILATING

BIDS ASKED

Ark., Benton—Oct. 22, by Arkansas Constr. Comn., 207 Marion Hotel Bldg., Little Rock, T. Davis, secy., boiler house, smokestack underground steam and hot water distribution system, boilers, boiler room appurtenances for Farm Colony, State Hospital for Nervous Diseases, Saline Co. Mann, Wanger & King, Donaghey Bldg., Little Rock, archts. Noted Mar. 12.

Mass., Gloucester—Addison Gilbert Hospital, 298 Washington St., taking bids heating system in hospital, Washington St. $25,000. A. Kellogg, 585 Boylston St., Boston, engrs.

CONTRACTS AWARDED

Mass., Palmer—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, heating, plumbing in Monson State Hospital, to J. S. Cassedy, 133 Austin St., Cambridge; electrical work to Brady Electric Co., 236 Bedford St., Fall River. Est. $25,000 or more.

N. Y., New York—Bd. Higher Educ., at office Secretary Hunter College, Park Ave. and 68th St., heating and ventilating for Hunter College, to G. E. Gibson Co., 441 Lexington Ave., $95,959. Noted Sept. 3.

UNCLASSIFIED

PROPOSED WORK

Mo., Bagnell—FISH HATCHERY—Union Electric Light & Power Co., 12th and Locust Blvds., St. Louis, preliminary plans fish hatchery to stock Lake of Ozarks formed by water backed up by hydro-electric dam on Osage River, near here, Missouri State Game & Fish Dpt., J. Ross, comr., Jefferson City, will supervise. $40,000-$50,000.

N. H., Hooksett—AUDITORIUM—Mount St. Mary's Academy, M. De La Salle, in charge, plans by Maginnis & Walsh, Statler Bldg., Boston, Mass., auditorium, $25,000 or more. Noted Aug. 12, under "Schools."

Que., Montreal—TRAFFIC LIGHT SYSTEM—City, A. Weldon, chn. com., soon takes bids additional traffic light system. $150,000.

BIDS ASKED

Md., Crisfield—DEPOT, BAGGAGE ROOMS, etc.—See "Contracts Awarded."

Mass., Quincy—SHELTER—Oct. 8, by Metropolitan Dist. Comn., 20 Somerset St., Boston, skating shelter, Blue Hill Reservation.

N. Y., New York—COAL POCKETS—See "Contracts Awarded."

N. Y., New York—STANDARDS—Oct. 6, by Superintendent P. Wks., Div. Architecture, State Office Bldg., Albany, 2 bronze electric standards, New York State Roosevelt Memorial; adv. E. N.-R. Oct. 1.

N. Y., Willard—CHIMNEY—Oct. 7, by Dpt. Mental Hygiene, State Office Bldg., Albany, chimney for boiler house, at Willard State Hospital.

CONTRACTS AWARDED

Maryland—ELECTRICAL WORK—Dpt. P. Wks., State House, State Roads Comn., Baltimore, G. C. Uhl, chn., all electrical work necessary for complete electric lighting system for railroad grade elimination at Bare Hills. Contr. B-226-43. Baltimore Co., to Roland Electrical Co., 418 East Pratt St., Baltimore, $1,453. Noted Sept. 17.

Md., Crisfield—DEPOT, BAGGAGE ROOMS, etc.—Pennsylvania R.R., T. J. Skillman, ch. engr., Broad St. Sta., Phila., Pa., depot, platform, day labor. Noted Sept. 10.

Mass., North Adams—COAGULATION BASIN—Arnold Print Wks., coagulation basin, to Girdon & Sutton, 88 Main St. Est. $50,000.

Mass., Walpole—MEMORIAL—Town, H. W. Caldwell, chn. Building Comn., 1 story, brick, stone, to F. J. Tetreault & Co., 252 Common St., $43,961. Est. $50,000. Noted Sept. 24.

N. Y., Geneva—ELEVATOR—Commissioner Dpt. Educ., Education Bldg., Albany, elevator for horticultural building, New York State Agricultural Experiment Station, to Houser Electric Co., 314 Water St., Syracuse, $3,170. Noted July 30.

N. Y., New York—COAL POCKET etc.—Cullen Fuel Co., 192 Lexington Ave., coal pocket, concrete, scale house, to Nicholson Co., 40 Lexington Ave. Est. $40,000. Noted Sept. 17.

N. Y., New York—COAL POCKETS—McNulty Bros. Coal Co., 1932 Arthur Ave., 1 story, frame 171st St. and Harlem River, day labor. S. J. Kessler, 125 West 45th St., archt. Noted Sept. 17.

N. Y., New York—ELEVATORS—Superintendent P. Wks., at office Bd. Trustees New York State Roosevelt Memorial Museum of Natural History, elevators for New York State Roosevelt Memorial Wing, to Otis Elevator Co., 260 11th Ave., $45,760. Noted Aug. 12.

Oklahoma and Kansas—PIPE LINE—Globe Oil & Refining Co., Blackwell, Okla., 145 mi. pipe line from Blackwell, Okla. to Ritz-Canton Fields in Kansas. **Maturity indefinite.**

MATERIALS

BIDS ASKED

OIL CIRCUIT BREAKERS—**Los Angeles, Calif.**—Oct. 8, by T. Oughton, city purch. agt., two G.E. Type F. H. 206-b, 2,000 amp., 15,000 volt., 750,000 kva. oil circuit breakers. Spec. 2619.

GASOLINE, KEROSENE, etc.—**Indiana**—Oct. 14, by State Hy. Comn., Indianapolis, 2,800,000 gal. gasoline, 60,000 gal. kerosene, 110,000 gal. motor and transmission oils, 1,000 gal. other lubricating oils, incl. compressor, cylinder, paraffin and machine oils, 120,000 lb. summer transmission grease, pressure gun grease, 1,000 lb. fibre and axle greases. J. J. Brown, dir.

TRAFFIC SIGNAL LANTERNS, etc.—**New York, N. Y.**—Oct. 5, by P. J. Dooling, comr. Purchase, Municipal Bldg., traffic signal lanterns and control equipment to Police Dpt., tractor shovel, hydrant keys, sewer bars, hose reel carts to Dpt. Sanitation; pipe, pipe fittings to Dpts. Correction, Docks, Water Supply, Gas & Electricity.

CABLE, etc.—**Columbus, O.**—Oct. 8, by Bd. Purchase, H. C. Cain, secy., City Hall, 8,935 ft. No. 350,000 C.M. 3 conductor, semi-sector 5/32 in. x 5/32 in. impregnated paper, 8/64 in. lead sheath cable; 8,505 ft. No. 250,000 C.M. 4 conductor, semi-quad, 3/32 in. x 3/32 in. impregnated paper, 8/64 in. lead sheath cable; 250 ft. No. 2/0 single conductor 10/32 in. varnished cambric, 6/64 in. lead sheath cable; 1,000 ft. No. 2/0 4 conductor, semi-quad, 3/32 in. x 3/32 in. impregnated paper, 8/64 in. lead sheath cable, 4 subway distribution boxes, 200 A., 4,000 volt, 4 conductor, 4 way, for municipal light plant.

CONTRACTS AWARDED

CEMENT, etc.—**Los Angeles, Calif.**—Los Angeles Co., 1,575 bbl. portland cement for gunite facing slab and pre-cast concrete blocks for protection on Rio Hondo, to Riverside Cement Co., 621 South Hope St., at $2.40 per bbl.; 1,850 bbl. for concrete facing slab and miscellaneous concrete structures at east abutment of Devils Gate Dam, to Southwestern Portland Cement Co., 727 West 7th St. $2.40 per bbl. Noted Sept. 10.

CAST IRON PIPE FITTINGS—**San Francisco, Calif.**—L. S. Leavey, city purch. agt., 200,000 lb. c.i. pipe fittings for Water Dpt. (Proposal 7491), to Enterprise Fdry. Co., 2902 19th St., at $0.04½ per lb.

WATER PIPE—**Hartford, Conn.**—Metropolitan Water Dist., 1026 Main St., c.i. bell and spigot pipe, to Warren Fdry. & Pipe Co., 11 Bway., New York. $14,626.

ASPHALT, etc.—**Louisville, Ky.**—G. W. Stege, city purch. agt., West Bway., year's supply materials for engineering department, asphalt, to F. G. Breslin Co., 32nd and Market Sts., $150,000; vitr. pipe, to R. C. Tway Coal Co., Inter-Southern Insurance Bldg., $35,000; rein.-con. pipe, to Independent Concrete Pipe Co., $51,000; cold patch, to Andrew-Collings Asphalt Co., $5,000; sand and gravel, to E. T. Slider Co., New Albany, Ind., $10,000; ready mixed concrete, to American Builders' Supply Co., 405 Garden St., $18,000; sewer castings, to Henry Vogt Machine Co., 1000 West Ormsby St., $15,000. Grand total $284,000.

EQUIPMENT

BIDS ASKED

ROLLING DOORS—**San Francisco, Calif.**—Oct. 15, by State Harbor Comn., Ferry Bldg., 12 steel rolling doors for Pier 23.

BAND SAW—**Wellesley, Mass.**—T. J. Murray, 33 Cedar St., in market power feed band saw, dowel machine, four sided moulder 6 or 8 in.

STOKERS, etc.—**Slippery Rock, Pa.**—Slippery Rock State Teachers College, J. L. Eisenberg, pres., mechanically operated stokers under 2 large boilers, large steel smokestack, electrical generating equipment for power plant improvements. $10,000. J. N. Chester Engineers, Clark Bldg., Pittsburgh, engr.

Equipment (Continued)

CONTRACTS AWARDED

TRUCKS, etc.—**Indianapolis, Ind.**—Bd. P. Wks., City Hall, flusher chassis, to G. M. Bailey Co., 378 South Senate Ave. $4,400, and to Service Truck Sales Co., 26 South Senate Ave. $7,785; road oiler chassis, to Martin Truck Co., 291 North Capitol Ave., $3,085; sewer eductor, to McKinney & Maxell, Indianapolis, $3,502; flusher units for chassis, to C. Haas & Co., Indianapolis, $6,360; road oiler chassis and sewer eductor, to Elgin Sweeper Co., Indianapolis, $2,200 and $5,740 respectively. Grand total $33,072.

CHLORINATOR—**Ottawa, Ont.**—City, 300 lb. vacuum type pedestal chlorinator, to Wallace & Tiernan, Ltd., Foy Bldg., Toronto, $3,129.

FOREIGN

England—Church of Jesus Christ of Latter Day Saints, 47 E.S.T., Salt Lake City, Utah, or c/o J. Widtsoe, pres. European Missions of Latter Day Saints Church, Liverpool, plans church at Liverpool, to exceed $150,000; and church in London, $400,000. **Maturity indefinite on former project.**

New Zealand, Wellington—Dec. 15, by Secretary Dpt. P. Wks., 270 galvanized steel transmission towers, complete with arms, stubs, accessories.

Siam, Bangkok—Nov. 12, by Manager State Railway, points and crossings in 50 lb. rails and 1000 tons 9 metre rail.

Commercial Buildings

RESIDENTIAL

BIDS ASKED

Mass., Cambridge—See "Contracts Awarded."

N. J., Jersey City—A. A. Brengle, 123 North St., taking bids on separate contracts two 3 story, basement, brick, steel, North St. $150,000. J. G. Helmers, 147 Summit Ave., Union City, archt.

N. J., Mount Freedom—J. D. Allen, archt., 87 Harrison Ave., West Orange, taking bids general contract 2½ story, basement, brick, steel hotel, for I. Saltz, Morris Plains Rd. $150,000.

N. Y., Jamaica—See "Contracts Awarded."

N. Y., Long Island City—See "Contracts Awarded."

N. Y., New York—See "Contracts Awarded."

N. Y., Woodside—See "Contracts Awarded."

CONTRACTS AWARDED

Mass., Cambridge—Jackson Constr. Co., c/o P. J. Brown, archt., 51 Cornhill, Boston, 4 and 10 story, basement, brick, stone, steel apartment, garage, store, plain founds., Mass. Ave. corner Garfield St., separate contracts. Est. exceeds $150,000.

N. Y., Jamaica—United Associated Homes, 89-31 161st St., Jamaica or c/o A. Allen, archt., 163-18 Jamaica Ave., 2 story, basement, brick, steel, 74th Ave. and West 89th St., separate contracts, $250,000.

N. Y., Long Island City—Kazolif Building Corp., 60-19 Roosevelt Ave., Woodside, 6 story, basement, 75 x 115 ft., Crescent St. and 31st Dr., separate contracts, $175,000. Wuest & Bailey, 32-02 30th Ave., archts.

N. Y., New York—One Hundred Eighty-Two Corp., W. Guterman, pres., 119 West 40th St., apartment, 226 East 76th St., separate contracts, $450,000. E. Roth, 1440 Bway., archt.

N. Y., New York—M. E. Paterno, 60 East 42nd St., 21 story, 45 x 100 ft. 103 East 96th St. and 1245 Park Ave., separate contracts, $2,300,000. R. Candela, 578 Madison Ave., archt. Noted Sept. 17.

N. Y., Woodside—Curtis N. Mathews, Lincoln and Roosevelt Aves., apartment, Elko Rd. and Calamies Ave., separate contracts, $150,000.

Pa., Jenkintown—Owner, c/o C. H. Fries, archt., Frankford and Oxford Sts., 6 story, basement, 35 x 110 ft., rein.-con., brick, steel, plain found., to Yardley Constr. Co., 1505 Race St., Phila. Noted Sept. 10.

CLUBS

PROPOSED WORK

N. J., Allendale—Women's Club, B. W. Griffiths, in charge, Brookside Ave., will not build 2 story, basement, brick, steel, club house, $150,000. Project abandoned. Noted June 18.

N. J., Bayonne—B.P.O.E. Bayonne Lodge 39 West 34th St., will not build 2 story, basement, brick, steel, West 34th St., $150,000. Project in abeyance. Noted June 18.

O., Cleveland—West Side Masonic Temple Building Co., W. B. Boom, chn. building com., 2313 Elm St., plans by C. W. Hopkinson, Rose Bldg., 2 story, basement, 80 x 120 ft. masonic temple, Franklin Circle. $200,000.

BIDS ASKED

N. J., Paterson—Oct. 1, by Goodman & Schulman, archts., 20 Smith St., Paterson, general contract 2 story, basement, brick, steel club, plain found., Carroll St. and 2nd Ave., for Workman's Circle Labor Lyceum Corp. $150,000. Noted Sept. 24.

CONTRACTS AWARDED

Conn., New Haven—Ray Tompkins House, Yale University, 3 story, 65 x 220 ft., brick, stone club, Dixwell Ave. and Tower Parkway, to Marc Eidlitz & Son, Inc., 100 East 42nd St., New York. Est. $550,000.

HOSPITALS

PROPOSED WORK

Mass., Boston — Deaconess Hospital, H. Brewer, pres., sketches by Coolidge, Shepley, Bulfinch & Abbott, Ames Bldg., 5 story, basement, irregular sized, brick, stone clinic, plain found., Deaconess Rd. To exceed $150,000.

Mass., Danvers—Hunt Memorial Hospital revised plans by G. H. Fanning, 221 Essex St., Salem, 3 story, basement, brick hospital addition. $150,000. Noted Aug. 20.

Mass., Peabody—Joseph B. Thomas Hospital, King St., plans J. M. Gray & J. P. Heffernan, 175 High St., Boston, brick hospital addition, $150,000.

N. J., Jersey City—Bd. City Comrs., J. Wasserelk., City Hall, sketches by J. T. Rowland, Jr., 30 Journal Sq., three 4 and 5 story, brick, steel laboratories, 2 hospital buildings, Medical Center. $5,000,000. Noted Sept. 24 Daily.

N. J., Orange—Welfare Federation of the Oranges, 439 Main St., New Jersey Orthopedic Hospital and Dispensary addition, Lincoln Ave. **Maturity probably in December.** $150,000. Noted Sept. 3.

N. J., Preakness—Bd. Freeholders Passaic Co., Court House, Paterson, bids in spring on revised sketches 2 story, basement, brick, steel preventorium, Valley View. $500,000. F. W. Wentworth, 140 Market St., Paterson, archt. Noted June 18.

N. J., Scotch Plains—Bd. Freeholders Union Co., Court House, Elizabeth, 2 story, basement, brick, steel, sanitorium, at Bonnie Burn Sanitorium. $150,000. **Maturity probably in March.** Oakley & Son, 1259 Clinton Pl., Elizabeth, archts. Noted Sept. 10.

N. J., Skillman—Dpt. Institutions and Agencies, State Office Bldg., Trenton, bids in November, 2 story, basement, brick, steel dormitory for tubercular patients State Village for Epileptics. $150,000. Div. Architecture and Constr., State Office Bldg., archts. Noted July 16.

Va., Norfolk—City Boulevard Hospital Addition, Hampton St. $850,000.

BIDS ASKED

Ind., Batesville—Oct. 20, by M. Hillenbrand Estates, c/o Sisters of St. Francis, 3 story, basement, 40 x 150 ft., brick, rein.-con. hospital. $150,000. W. Scholer, Lafayette, archt.

N. J., Long Branch—E. C. Hazard Hospital, E. C. Hazard, doctor, 81 Washington St., bids about Oct. 15, general contract 12 story, basement, 150 x 200 ft., brick, steel, Washington Ave. and Dewey St. $1,000,000. C. C. Hartmann, Greensburgh, N. C., archt. Noted Aug. 6

N. J., Newark—Bd. City Comrs., City Hall, bids about Nov. 1, 2 story, basement, 30 x 110 ft., brick steel ward, recreational building addition, Ivy Hill. $200,000. J. T. Simpson, 45 Walnut St., archt. Noted Sept. 24.

N. Y., Long Island City—Oct. 8, by J. G. W. Greefl, comr. Dpt. Hospitals, Municipal Bldg., New York, general contract and completing Building D, Queens General Hospital, 164th St. between Goethals Ave. and Grand Central Parkway. Former bids rejected. S. W. Jones & J. E. Kleist, 25 West 45th St., New York, archts. Noted Sept. 10.

O., Lima—Oct. 14, by City, 4 story, basement, brick, steel, concrete main hospital, nurses home, power and laundry building. $600,000. Thos. D. McLaughlin & Associates, Dominion Bldg., archt. Noted June 15.

CONTRACTS AWARDED

Calif., San Francisco—S. J. Hester, secy. Bd. P. Wks., City Hall, general contract 4 story, basement, rein.-con. health center building, to H. L. Peterson, 731 Treat Ave., $248,979. Noted Sept. 10.

Conn., Willimantic—Windham Co. Memorial Hospital, G. E. Taylor, chn. Building Comm., 3 story, basement hospital, 3 story basement nurses home, 2 solariums, power plant and laundry, all concrete, brick, steel, stone to H. Wales Lines Co., 134 State St., Meriden, $415,000. Noted Aug. 20.

Idaho, Blackfoot—A. Harbour, comr. P. Wks., Boise, general contract state mental hospital, to Gooding Heating & Plumbing Co., Gooding, $131,900; plumbing and heating, to E. E. Marcoe, Pocatello, $27,357; electrical work, to Electric Appliance Co., Lewiston, $10,000. Grand total $169,357. Noted Aug. 19.

Mass., Boston — City Institutions Dpt., 2 story, basement receration building at Long Island Hospital, to J. A. Singarella, Park Sq. Bldg., $223,000. Noted July 16.

Mass., Gloucester — Gilbert Hospital, 298 Washington St., 3 story, basement, brick hospital annex, plain found., to R. E. Runnels Constr. Co., 411 Chalifoux Bldg., Lowell. Est. $150,000. Noted Aug. 6.

Mass., Palmer—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, 3 story, 45 x 90 ft., brick, steel infirmary, to Morris Constr. Co., 267 Central St., Lowell. Est. $150,000. Noted Sept. 3.

N. Y., Pine Aire Station—Dpt. Mental Hygiene, State Office Bldg., Albany, general contract, Buildings 16, 18, 19, 20, 36, 42, 43, 54, 57, 58, 59, 60, 61, 69, 70, 71 and 72, railroad shelter, at Pilgrim State Hospital, Sufflok Co., to Brady Concrete Corp., 25 West 45th St., New York, $1,833,000; sanitary work, to J. D. Duffy, 342 Madison Ave., New York, $120,767; electrical work, to H. Z. Altberg, 1776 Bway., New York, $156,760. Grand total $2,110,527. Noted July 30.

Pa., Phila.—Wills Eye Hospital, c/o E. S. Stewart, Lafayette Bldg., 7 story, basement, 174 x 198 ft., rein.-con., brick, steel hospital, plain found., to J. McShain, 23rd and Winter Sts., $1,004,200. Noted Sept. 17.

CHURCHES

PROPOSED WORK

Mass., Framingham—Parker Baptist Church, F. P. Jefferson, 115 Franklin St., sketches by F. A. and F. M. Kendall, 45 Bromfield St., Boston, reconstructing 1 story, basement, brick, stone church, plain found., Parker St. $150,000.

Mass., Leicester—St. Joseph's Roman Catholic Parish, 753 Main St., plans by J. W. Donohue, 1200 Main St., 3 story, brick, stone convent, for Sisters of Mercy, Main St. $150,000. Noted July 9.

Mo., Kansas City—Church of Christ Scientist plans by Keene & Simpson, 1005 Land Bank Bldg., church, $150,000. **Maturity soon.**

N. J., Newark—H. J. Weiler, archt., 40 Romaine St., bids probably in November, general contract, 2 story, basement, brick, steel church for owner, c/o architect. $150,000. Noted Sept. 17.

N. J., Passaic—J. T. Cauley, archt., 26 Piaget Ave., Clifton, bids probably in November, general contract 2 story, basement, 50 x 100 ft., brick, steel, Armory Park, for St. Peter and Pauls Polish Natl. Church, J. Wroblewski, 126 River Dr. $150,000. Former bids rejected. Noted Sept. 10.

N. J., Paterson—Owner, c/o E. R. Cox, archt., 136 Washington St., will not build 2 story, basement, brick, steel church. $2500,000. Project abandoned. Noted June 11.

N. J., West Orange—Roman Catholic Diocese, 32 Mulberry St., Newark, 2 story, basement, brick, steel church, St. Cloud Sect. $150,000. Architect not appointed. Project abandoned. Noted Sept. 10.

N. Y., Troy—T. E. Sheehan, archt., 126 Boylston St., Boston, Mass., bids in October, 70 x 260 ft. granite, limestone church, for St. Joseph's Seminary. $300,000.

R. I., Providence—St. Matthew's Roman Catholic Parish, c/o A. J. Murphy, archt., 25 Fenner St. soon lets contract 1 and 2 story, basement, brick, stone church, school, plain founds., Park and Elmwood Aves. $150,000. Noted Apr. 16.

Wis., LaCrosse—First Presbyterian Congregation, 1611 Main St., limestone, brick church, West Ave., $150,000. Architect not appointed.

Ont., Toronto—Church of the Holy Cross, A. Miller, pastor, 33 Cardena Ave., plans by J. G. Morton, 86 Adelaid St. E., concrete, stone, brick, steel church, rectory, school at Donlands Ave. and Cosburn Ave., East York Twp. $250,000.

BIDS ASKED

N. J., Jersey City—Oct. 5, by W. Neumann, archt., 26 Journal Sq., general contract altering 2 story, basement, brick, steel, Summit and Magnolia Aves., for Westminster Presbyterian Church, 304 Academy St. Est. $150,000. Noted Sept. 24.

N. J., Morristown—Fanning & Shaw, archts., 49 Ward St., Paterson, bids about Nov. 15, general contract 3 story, basement, brick, steel church, school, Columbia St. and Sussex Ave., for St. Margarets Roman Catholic Church, c/o architects. $150,000. Noted Sept. 24

CONTRACTS AWARDED

Calif., San Diego—F. L. Hope, archt., Bank of America Bldg., general contract part 2 and 3 story, 150 x 225 ft., rein.-con. monastery, for Carmelite Sisters, c/o Architect, to F. E. Young Co., 1105 Bank of America Bldg., $134,797; plumbing, to F. Heilbron, 1445 5th Ave., $6,660. Noted Sept. 10.

Calif., Santa Barbara—First Church of Christ Scientist, Class A and B building, rein.-con. church, to W. L. Smoek, 21 East de La Guerra St. Est. $125,000. Noted May 21.

Calif., Westwood — Roman Catholic Bishop Diocese of Los Angeles and San Diego, Selby and Ohio Aves., Los Angeles, general contract 1 story, basement 42 x 122 ft. auditorium, to Hart & Petley, 222 Tower Bldg., Santa Monica, lumber, to Golden State Lumber Co., 2166 Santa Monica Blvd.; reinforcing steel, to Soule Steel Co., 6200 Wilmington St., Los Angeles; roofing, to Passmore Roofing Co., 1430 Haxworth St., Los Angeles; rock and gravel to Consolidated Rock Products Co., 656 South Los Angeles St., Los Angeles. Est. $300,000. Noted Sept. 10.

Ind., Ft. Wayne—St. Vincents Church, general contract rein.-con., brick orphans home, to Buesching & Haverman, 403 East Superior St. $260,000. Noted July 9.

Mass., Northampton—St. Valentine Polish Natl. Church, L. A. Dabrowski, 200 King st. pastor, 1 story, basement, brick, stone, plain found., to Martin Bros., 21 Temple St., Holyoke. Est. $150,000. Noted Aug. 27.

Wis., Marinette—First Trinity Church, 1509 Thomas St., brick, rein.-con., tile to Immel Constr. Co., 19 West Wisconsin St., Fond du Lac. Noted Sept. 17.

SCHOOLS

PROPOSED WORK

Calif., San Francisco—State of California (State Teachers College) plans by S. Heinon, 605 Market St., Science Building, 3 story, rein.-con., Buchanan St. $150,000.

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Schools (Continued)

Calif., San Francisco—University of California, Berkeley, plans by W. C. Hays, Crocker 1st Natl. Bank Bldg., 6 story rein.-con. medical building, 2nd Ave. $500,000.

Conn., New London—Connecticut College for Women, plans by C. E. Cutler, 168 Kings Highway, Westport, dormitory on campus. $150,000 funds being raised.

Conn., Waterbury—City, J. J. Walsh, chn. building comn., plans by J. J. Scolan,, Waterbury, and soon takes bids 2 story, basement, brick school, plain found., Woodland and Homestead Aves. $150,000. Noted Nov. 20.

Ky., Louisville—Bd. Educ. bids latter part year Senior-Junior High School, steel, rein.-con., brick, stone on 560 x 900 ft. site, 1st, 2nd, Lee and Avery Sts. Architectural Dept., c/o owner, archts.

Mass., Brighton (sta. Boston)—City of Boston, Dpt. School Buildings, soon takes bids 2 story, basement school, Bertram St. Gardner Dist. $150,000. G. N. Jacobs, 114 State St., Boston, archts. Noted Aug. 10.

Mass., Chilmark—Town, Bd. Selectmen, altering and constructing 2 story, basement, brick addition to Menemsha School, plain found. $150,000.

Mass., Milton (br. Boston)—Town, School Dpt., C. M. Rogerson, chn. building comn., brick, steel school. $300,000. Project in abeyance until 1932. Shepard & Stearns, 65 Franklin St., Boston, archts. Noted Sept. 24.

Mass., Wellesley—Wellesley College, c/o W. I. Aldrich, archt., 30 Newbury St., Boston, sketches 4 story, basement, irregular sized, cooperative dormitory. $150,000 or more.

Mass., Worcester—Clark University, 340 Main St., plans by E. Kebbon, 522 5th Ave., New York, 2 story, brick, stone, steel gymnasium, auditorium, Main St. $150,000. **Maturity in late winter.** Noted Sept. 10.

Mass., Wrentham—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, soon takes bids 3 story, basement, brick infirmary at Wrentham State School, plain found. $150,000. C. P. Hoyt, 8 Beacon St., Boston, archt.

N. J., Cliffside Park—Bd. Educ., Palisade Ave., bids probably in November, general contract 2 story, basement, brick, steel addition to School 3. $280,000. R. J. Cadien, 545 Gorge Rd., Grantwood, archt. Noted Sept. 10.

N. J., Clifton—Bd. Educ., High School, will not build 2 story, basement, brick, steel, Conrad Ave., between Broad and Grove Sts. $200,000. Project abandoned. Noted July 9.

N. J., Demarest—Bd. Educ., 2 story, basement, brick, steel school. $150,000. **Maturity probably in spring.** Noted Sept. 17.

N. J., Fairview—Bd. Educ. revised sketches by R. Cadien, 545 Gorge Rd., Grantwood, Junior High and Grade School, 2 story, basement, brick, steel. $150,000. **Maturity in spring.** Noted Sept. 17.

N. J., Jersey City—Bd. Educ., Administration Bldg., revised sketches by J. T. Rowland, Jr., 30 Journal Sq., School 38, 2 story, basement, brick, steel, rein.-con. $185,000, Noted Sept. 17.

N. J., Jersey City—Bd. Educ., Administration Bldg., Grade School Replacement 7, 3 story, basement, brick, steel, Central Ave. $150,000. **Maturity spring 1932.** Architect not appointed. Noted Sept. 3.

N. J., Lakewood—Bd. Educ., two 2 story, basement, brick, steel schools. $250,000. Project in abeyance. C. B. Cook, 505 Bond St., Asbury Park, archt. Noted Aug. 19.

N. J., Little Ferry—Bd. Educ., Little Ferry, revised sketches by Hacker & Hacker, 201 Main St., Fort Lee, 2 story, basement, brick, steel, rein.-con. school. $150,000. **Maturity in spring.** Noted Aug. 20.

N. J., Millburn—Bd. Educ., High School, 2 story, basement, brick, steel school. $150,000. Project in abeyance. E. Sibley & G. M. Cady, 1034 Edgewood Lane, Palisade, archts. Noted Sept. 17.

N. J., Montclair—Bd. Educ., 22 Valley Rd., plans by Starrett & Van Vleck, 393 7th Ave., New York, 2 story addition to Rand School, Fullerton and Chestnut Sts. $150,000.

N. J., Montclair—Bd. Educ., plans by Starrett & Van Vleck, 393 7th Ave., New York, Hillside School. To exceed $150,000. **Maturity indefinite.**

N. J., Montclair—Bd. Educ., Valleu Rd., altering and constructing 2 story, basement, brick, steel addition to Spaulding School Range Rd. $150,000. **Maturity indefinite.** Architect not appointed.

N. J., Newark—Bd. Educ., City Hall, will not build 2 story, basement, brick, steel addition to Madison Avenue School, Madison Ave. $150,000. Project abandoned. C. F. Bertrand, 222 Market St., archt. Noted June 25.

N. J., Paterson—Bd. Educ., City Hall, 2 story, basement, brick, steel, rein.-con., Totowa Ave. $150,000. **Maturity probably in December.** Lee & Hewitt, 152 Market St., archts. Noted Sept. 10.

N. J., Paterson—Bd. Educ., City Hall, bids about Nov. 15, 2 story, basement, brick, steel, rein.-con., East 18th St. $250,000. Fanning & Shaw, 49 Ward St., archts.

N. J., Pompton Lakes—Bd. Educ., C. E. Walton, superv. principal, Municipal Bldg., bids in November, 2 story, basement, brick, steel high school. $230,000. Hacker & Hacker, 201 Main St., Fort Lee, archts.

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N. J., West Fort Lee—Bd. Educ., J. G. Abbott, secy., High School, Fort Lee, sketches by Hacker & Hacker, 201 Main St., Fort Lee, 2 story, brick, steel, rein.-con., Main and Linwood Aves. $150,000. Noted Aug. 6.

N. J., West New York—Bd. Educ., Municipal Bldg., will not build 3 story, basement, brick, steel high school addition, Park Ave. $150,000. Architect not appointed.

N. Y., Brooklyn—McKenna & Irving, archts., 15 Park Pl., New York, soon takes bids general contract, 2 story, 60 x 160 ft. school, Glenwood Rd. and East 38th St., for Owner, c/o F. Murphy, pastor, 3624 Glenwood Rd. $165,000. Noted Sept. 3.

N. Y., Brooklyn—Bd. Educ., 500 Park Ave., New York, sketches by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, Franklin K. Lane High School, Jamaica Ave. and Eldert St. $3,000,000. Noted May 7.

N. Y., Cold Spring—Bd. Educ., school. $250,000. Project in abeyance. Knapp & Morris, 171 Madison Ave., New York, archts. Noted June, 18.

N. Y., Long Island City—Bd. Educ., 500 Park Ave., New York, plans by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, high school. $3,000,000. **Maturity indefinite.**

N. Y., New York—Bd. Educ., 500 Park Ave., plans by W. R. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, high school, Bronx Boro. $3,000,000.

N. Y., New York—Bd. Educ., 500 Park Ave., plans by W. C. Martin, archt. and supt. School Buildings, Flatbush Ave. extension and Concord St., Brooklyn, P. S. 95, Gouverneur, Norman and Sedgwick Aves. $602,000.

Pa., Franklin—Bd. Educ., P. E. Cunningham, pres., 1036 Liberty St., sketches Junior High School, brick, steel, probably gymnasium, Otter St. $150,000. Architect not appointed.

Pa., McKeesport—Bd. Educ., J. B. Richey, supt., plans by C. R. Moffitt, 304 Masonic Temple, brick, steel industrial school, Baillie and Cornell Sts. $600,000. C. L. Wooldridge, Fulton Bldg., Pittsburgh, consult. engr.

Pa., Pittsburgh—Bd. Educ., H. W. Cramblet, secy., plans by E. Stotz, Bessemer Bldg., (1st unit) Liberty Elementary and Junior High School, brick, steel, Ellsworth Ave. $440,000. C. L. Wooldridge, Inc., Fulton Bldg., consult. engrs.

Pa., Pittsburgh—Bd. Educ., H. W. Cramblet, secy., Administration Bldg., plans by Marks & Kann, Home Trust Bldg., East Brookline Elementary School, brick, steel, Provost site. $200,000. C. L. Wooldridge, Fulton Bldg., consult. engr.

R. I., Providence—City, P. Building Dpt., City Hall, plans by T. J. H. Pierce, City Hall, and soon takes bids 2 story, basement, 70 x 200 ft., brick, steel school, incl. 2 gymnasiums, auditorium, Windmill and Paul Sts. $900,000.

Tex., San Antonio—Emmet T. Jackson, Builders Exch. Bldg., plans by Phelps & DeWees, Gunter Bldg., Junior-Senior Colored school, 2 story, 110 x 190 ft., brick, rein.-con., plain found., Montana, Grimes, East Commerce and Rio Grande Sts. $150,000. W. Simpson, Milam Bldg., engr.

Wis., Milwaukee—Bd. Educ. plans by G. E. Wiley, c/o School Bd., and takes bids probably in November, Rufus King High School, 1, 2 and 3 story, basement, 180 x 540 ft., brick, steel school, West Fiebranitz St. $1,125,000.

Que., Montreal—Roman Catholic School Comn., 113 Ste. Catherine St. W., plans by E. J. Turcotte, 1158 Beaver Hall, 3 story, brick, stone school, incl. auditorium, concrete found., for Ste. Anthony's Parish. $150,000.

BIDS ASKED

Calif., Berkeley — Oct. 13, by State Div. Architecture, Sacramento, 2 story school, 1 story academic dining hall, both rein.-con., at Home and Blind. $240,000.

La., Marrero—Oct. 14, by A. S. Montz, at office Architect, 740 Poydras St., New Orleans, Madonna Manor School, 2 story, incl. auditorium, at Hope Haven.

Mass., Dedham—Oct. 14, by Town, at office Superintendent Schools, Old High School Bldg., 2 story, basement, brick, steel, high school, plain found., Bryant St. $300,000. E. T. P. Graham, 171 Newbury St., Boston, archt. Noted July 9.

Mass., East Boston (sta. Boston)—Oct. 7, by City, Dpt. School Buildings, 2 story, basement, brick, stone, plain found., Chapman Dist. $230,000. Noted Sept. 24.

N. J., Clifton—Bd. Educ., High School, bids about Nov. 15, 2 story, basement, brick, steel, rein.-con., addition to School 15, Gregory Ave. $150,000. Lee & Hewitt, 152 Market St., Newark, archts. Noted Sept. 10.

N. J., Montclair—Oct. 20, by Bd. Educ., 22 Valley Rd., 2 story, basement, brick, steel school addition, Glenfield and Maple Aves. $400,000. Starrett & Van Vleck, 393 7th Ave., New York, archts. Noted Aug. 27.

N. J., Morristown—Bd. Educ., O. M. Goble, 50 Early St., bids about Nov. 15, 2 story, basement, brick, steel, rein.-con., Mills St. $200,000. C. C. Voorhees, 1 Schuyler Pl., archt. Noted Sept. 24.

N. J., West Orange—Bd. Educ., Northfield Ave., bids about Nov. 1, Junior High School, 3 story, basement, brick, steel, rein.-con., Gilbert St. $450,000. Hacker & Hacker, 201 Main St., Fort Lee, archts. Noted Sept. 3.

N. Y., Brooklyn—Oct. 2, by St. Vincent Ferrer Roman Catholic School, F. Murphy, pastor, 3624 Glenwood Rd., general contract sch... Glenwood Rd. and East 38th St. McKenna & Irving, 15 Park Pl., New York, archts. No... Sept. 3.

N. Y., Brooklyn—Oct. 8, by W. C. Mar... archt. and supt. School Buildings, Flatb... Ave. extension and Concord St., general ... tract P. S. 242, Flatlands Ave. from East 10... to 101st Sts., Canarsie, for Bd. Educ., 500 P... Ave., New York. Noted Sept. 24.

N. Y., Buffalo—Oct. 8, by W. A. Rathm... comr. P. Wks., Municipal Bldg., altering ... improving school, for Industrial Aid Bur... Elm St. between Eagle and Clinton Sts.

O., Cincinnati—Oct. 19, by Bd. Educ., ... West Court St., 2 story, basement, 167 x ... ft., brick, rein.-con. plain found., California ... $350,000. C. F. Cellarius, St. Paul Bldg., ar... Noted Aug. 20.

O., Hamilton—Oct. 15, by Bd. Educ., C. Hil... felder, clk., for Woodrow Wilson High School, ... story, brick, steel, concrete. $500,000. F. ... Mueller, Rentschler Bldg., archt. Noted July ...

R. I., Warwick—Oct. 7, by Town, W. ... Sherman, supt. schools, 2 story basement, 70 x 85 ft., brick, steel school. $150,000. Wm. R. Walker & Son, 49 Weybosset St., Providence, archts. Noted Sept. 10.

CONTRACTS AWARDED

Calif., Los Angeles—University of California, 3551 University Ave., to Bannuister-Field Co., 4101 Goodwin Ave., general contract, 1 story women's and men's gymnasium buildings, steel, concrete, incl. swimming pools, solariums, basket ball courts, $583,295; to T. Haverty Co., 8th and Maple Sts., heating and ventilating $104,986, plumbing $97,300, boiler plant $... 075; to Moore Electric Co., 323 West 3rd St., electrical work $23,876. Grand total $831,53... Noted Aug. 20.

Ind., English Lake—School Comrs., general contract brick, steel township school, to B. Lindin, Knox. Est. $150,000. Noted July 2.

N. H., Exeter—St. Michael's Roman Catholic Church, D. Cotter, pastor, 2 story, basement brick school, plain found., to T. O'Connor & Co., 238 Main St., Cambridge, Mass. Est. $150,000. Noted Sept. 3.

Mass., Winchester—Town, R. H. Stone, chn., altering and constructing high school addition, Main St. and Mystic Valley Parkway, to Frankini Bros. Co., Inc., 30 Mystic Ave., Medford, alteration $25,000, addftions $86,400. Noted Aug. 6.

N. H., Exeter—Phillips Exeter Academy, L. Perry, and Cram & Ferguson, archts., 248 Boylston St., Boston, Mass., 3 story, irregular sized, brick, limestone inn, to Peck-McWilliams Co., 47 West Main St., Norwich, Conn. Est. $150,000. Noted Sept. 17.

N. J., Wilburtha—Dpt. Institutions & Agencies, State Office Bldg., Trenton, general contract gymnasium and swimming pool for State Police Barracks, to J. H. Morris Co., 211 North Montgomery St., Trenton, $28,774; plumbing, to Burns, Lane & Richardson, 41 Adams Ave., Trenton, $4,658; heating, to Philip Slack, 219 Perry St., Trenton, $4,879; electrical work, to Piper Bros., Brunswick Ave., Trenton, $2,132; structural steel, to Bethlehem Steel Co., Bethlehem, Pa., $4,000. Grand total $44,563. Noted Sept. 3.

Pa., Muncy (Williamsport, P. O.)—Muncy School Assn., C. Woldron, pres., general contract 2 story, basement, native stone grade and high school, to Berwick Lumber & Supply Co., Berwick, $121,321. Noted June 26.

THEATRES

PROPOSED WORK

Calif., Los Angeles—M. M. Hansen, 6025 Hollywood Blvd., sketches theatre, Wilshire Blvd.

N. Y., Larchmont—Palley & Rosenthal, c/o Bronxville Theatre, 80 Kraft St., Bronxville, theatre, store and office, Palmer Ave. and Chatsworth St. $150,000.

BIDS ASKED

D. C., Wash.—Oct. 3, by J. J. Zink, archt., 2826 Overland Ave., Baltimore, Md., 1 story, balcony, brick, concrete, steel theatre, Conn. Ave. near Newark St. for H. M. Crandall, 4530 16th St. $250,000.

N. J., Red Bank—Boylan & Levine, archts., 143 Albany St., New Brunswick, bids about Oct. 15, general contract 2 story, basement, brick, steel theater, for Red Bank Amusement Co., c/o architects. Noted Aug. 27.

CONTRACTS AWARDED

Calif., Los Angeles—West Side Land Co., 4322 Crenshaw Blvd., general contract theatre, 3341 Leimert Pl., to Lindgren & Swinerton, 523 West 6th St.; heating and ventilating, to H. S. McClelland, 1930 South Compton Ave.; waste mould and cast stone, to Mission, Staff & Stone Co., 1512 Knowles St.; structural steel and miscellaneous iron, to Consolidated Steel Corp., 1200 North Main St. Est. $140,000.

Conn., Old Lyme—R. G. Bloomer, Ridgewood, N. J., 1 story, 60 x 145 ft. brick, Colonial Theatre, to Pieretti Bros., Centerbrook. Est. $150,000.

BANKS

PROPOSED WORK

N. J., Newark—Marzano State Bank & Trust Co., 15 Ferry St., sketches by W. E. Lehman, 972 Broad St., 2 story, basement, brick, steel, Market St. and Raymond Plaza. $150,000.

Banks (Continued)

BIDS ASKED

Mass., Beverly—Beverly Savings Bank, A. W. Forness, pres., taking bids altering and constructing 2 story, basement, brick, stone, steel, concrete bank addition, plain found., 175 Cabot St. $150,000. Hutchins & French, 11 Beacon St., Boston, archts.

OFFICES

PROPOSED WORK

D. C., Wash.—Epple & Kahr, archts. and engrs., 15 Washington St., Newark, N. J., bids about March, on revised preliminary plans brick, steel office for Owner, c/o architects. $3,000,000. Noted Dec. 24.

N. J., Montclair—H. and D. Harris, 539 Bloomfield Ave., revised sketches by A. E. Ramhurst, 516 Bloomfield Ave., 2 story, basement, brick, steel office, stores, Church St. and Fullerton Ave. $150,000. Noted Aug. 6.

BIDS ASKED

Mo., Kansas City—See "Contracts Awarded."

N. J., Jersey City—Owner, c/o D. J. Scrocco, archt., 60 Park Pl., Newark bids about Nov. 1, general contract 13 story, basement, 100 x 150 ft., brick, steel, rein.-con. office, store, Summit Ave. $150,000. Noted Sept. 24.

CONTRACTS AWARDED

Mo., Kansas City—New York Life Insurance Co., 20 West 9th St., New York, remodeling, altering office, awarding separate contracts, $200,000. Henri-Loury Eng. Co., engrs., 114 West 10th St. Noted Aug. 6.

STORES

PROPOSED WORK

Ind., Evansville—C. Espanlaub, Maryland and Lafayette Sts., plans by J. McCutchan, 604 Furn Bldg., remodeling and constructing 2 story, basement department store addition, Maryland and Lafayette Sts.

Me., Brunswick—W. F. Senter, 124 Main St., plans by J. P. Thomas, 537 Congress St., Portland, 3 story, basement, brick, steel store, bank and office, plain found., Main St. $150,000.

N. J., Hackensack—Boundary Realty Co., S. Kraft, pres., 7 Prospect St., 3 story, basement, brick, steel store, apartment, Essex and Prospect Aves. $150,000. Bids in, project in abeyance. L. H. Fredland & R. Lamb Assoc., 562 5th Ave., New York, archts.

N. J., Montclair—Owner, c/o Siegler & Greenberg, archts., 164 Market St., Newark, sketches 3 story, basement, brick, steel store, apartment, Bloomfield Ave. $150,000.

N. J., Montclair—Martin Realty Co., 39 Broad St., Bloomfield, 2 story, basement, brick steel store, office, 607-11 Valley Rd. $150,000. **Maturity indefinite.**

N. J., Montclair—Siegler & Greenburg, archts., 164 Market St., Newark, sketches made and takes bids probably in December, 3 story, basement, brick, steel, store, apartment, Bloomfield Ave., for Owner, c/o architects. $150,000. Noted Sept. 24 Daily.

BIDS ASKED

N. J., Asbury Park—C. B. Cook, archt., 505 Bond St., bids about Oct. 15, general contract 2 story, basement, brick, steel store, office for Owner, c/o architect. $150,000. Noted July 16.

N. J., Elizabeth—L. J. Keimig, archt., 40 Princeton Rd., taking bids general contract altering and constructing 2 story, basement, brick, steel store, office addition, 1147 Elizabeth Ave., for Owner, c/o architect. $150,000.

N. J., North Bergen—F. Huberti, archt., 116 Hauxhurst Ave., Weehawken, bids about Nov. 1, general contract 2 story, basement, 50 x 125 ft., brick, steel dance hall, store, 879-81 Bergenline Ave., for North Bergen Auto & Electric Supply Co., 883 Bergenline Ave. $150,000. Noted Sept. 24.

CONTRACTS AWARDED

Que., Montreal—Henry Gatehouse & Co., 628 Dorchester St. W., store, office, to C. E. Deakin, Bois Franc Rd., $150,000.

PUBLIC

PROPOSED WORK

Conn., Willimantic—HOME—State, Soldiers Home Comm., State House, Hartford, soldiers home group, West Main St. $1,500,000. Architect not appointed.

Ia., Council Bluffs—CITY HALL—City plans by H. J. Schneider, Council Bluffs, 2 story, elevated basement, rein.-con., brick, steel, Vine, Bryant and North Main Sts. $200,000. Noted May 21.

Me., Bangor—ARMORY—City, Mayor's Office, City Hall, plans by Nisbet & Griffin, 187 Middle St., Portland, 3 story, basement, brick, concrete armory. $150,000.

Mass., Arlington—LIBRARY—Town, C. E. Dallen, chn., Building Comm., c/o Gay & Proctor, archts., 248 Boylston St., Boston, sketches 2 story, basement, brick, branch library, Arlington Heights. $150,000.

Mass., Boston—MEMORIAL—Commonwealth of Massachusetts, War Memorial Investigating Com., receiving competitive sketches war memorial, Back Bay Fens, Boylston St. $1,000,000. W. D. Austin, 41 Pilgrim Rd., Roxbury, advisory archt. Architect not appointed.

Mass., Cambridge—COURT HOUSE—Comrs. Middlesex Co., East Cambridge, rejected bids Sept. 11, 3 and 4 story, basement, brick, stone, steel, plain found. $200,000. C. R. Greco, 11 Beacon St., Boston, archt. May reject plans. Noted Sept. 17.

Mass., Swampscott—MEMORIAL, etc.—Town, G. Gliddon, Planning Bd., receives sketches brick memorial building and police station, Burrill St. $150,000 or more. Architect not appointed.

Mich., Grand Rapids—CIVIC AUDITORIUM—Robinson & Campau, Grand Rapids, preparing plans and takes bids in December, fireproof civic auditorium for city. $1,000,000. Noted July 23.

N. J., Caldwell—BORO HALL—Bd. Boro Council, Boro Hall, revised sketches by Guilbert & Betelle, 20 Branford Pl., Newark, 2 story, basement, brick, steel, rein.-con., boro hall, $150,000. Noted Aug. 6.

N. Y., Jamaica—COURT HOUSE—G. U. Harvey, pres. Queens Boro, Queens Subway Bldg., Long Island City, rejected bids Aug. 31, general contract children's court house, Union Hall St. Will be readvertised. Noted Sept. 3.

N. J., West Orange—TOWN HALL—Bd. Town Council, R. C. Alford, clk., Town Hall, 2 story, basement, brick, steel. $150,000. **Maturity in March, 1932.** Architect not appointed. Noted Sept. 3.

Tex., Austin—STATE HIGHWAY OFFICE—State Bd. Control, C. Teer, chn. and State Hy. Comn., G. Gilchrist, engr., plans by Adams & Adams, Western Natl. Bank Bldg., San Antonio, and Lang & Mitchell, assoc. archts., 1st Natl. Bank Bldg., Dallas, 7 story, basement, 120 x 170 ft., brick, steel, stone, rein.-con. highway and record building, 11th and Brazos Sts. $500,000. Noted July 2.

Tex., Longview—COURT HOUSE, etc.—Gregg Co., c/o W. R. Hughes, judge, plans by Voelcker & Dixon, 207 Perkins-Snyder Bldg., Wichita Falls, court house, jail. $200,000. Noted Sept. 3.

B. C., Vancouver—OFFICE—Dominion Govt., Ottawa, Ont., plans by Dpt. P. Wks. (Fed.) engrs. and archts., Ottowa, Ont., 6 story, 120 x 200 ft., steel, concrete, stone, Granville and Cordova Sts. $750,000.

BIDS ASKED

Calif., San Francisco—WAR MEMORIAL—and OPERA HOUSE—City and San Francisco War Memorial Com., taking bids ornamental iron work, marble work and stage equipment, Civic Center. Total est. $5,000,000. Noted Sept. 11, 1930.

Ind., Crawfordsville—CITY HALL—Oct. 30, by City, 2 story, basement, rein.-con., brick, stone, tile city hall, police and fire department, Pike and Water Sts. $150,000. C. O. Beeson, Crawfordsville, archt. Noted July 30.

Ind., Evansville — COLISEUM — Nov. 2, by E. Koenemann, aud. Vanderburgh Co., 2 story, basement, steel addition, heating, ventilating rebuilt. $150,000. F. E. Fowler, 505 Central Union Bldg., archt. Noted June 11.

Ind., Indianapolis—POOR HOME—Nov. 6, by Bd. Comrs. Marion Co., dismantling, constructing buildings at Marion Co. Asylum for the Poor, incl. plumbing, heating, electric wiring and fixtures. H. Dunn, aud.

N. J., Bordentown—DORMITORY—Oct. 6, by Dpt. Institutions & Agencies, State House, taking bids altering and constructing 1 story, basement, brick, steel dormitory addition. $150,000. Guilbert & Betelle, 20 Branford Pl., Newark, archts.

N. Y., Bedford Hills—REFORMATORY—Oct. 22, by Dpt. Correction, State Office Bldg., dining room and kitchen building, segregation building, medical center housing, remodeling, service connection (tunnels) and power plant equipment, for State Reformatory for Women. Noted July 16.

N. Y., Dannemora—CELL BLOCK—Oct. 22, by Commissioner Correction, State Office Bldg., Albany, east cell block Sect. C and D, service connections (tunnels), Clinton Prison; adv. E. N.-R. Oct. 1.

N. Y., Syracuse—ARMORY—Oct. 14, by Div. Naval & Military Affairs, State Office Bldg., Albany, armory additions.

N. Y., Theills—FARM BARNS, DAIRY, etc.—Oct. 14, by Dpt. Mental Hygiene, State Office Bldg., Albany, farm barns, dairy building and farm colony dormitory, at Letchworth Village.

N. Y., West Haverstraw—HOME—Oct. 22, by Div. Standards & Purchase, Executive Dpt., Albany, dining room and kitchen building, laundry, storehouse, school house, treatment building, connecting corridors, tunnel and service connections for State Reconstruction Home.

N. Y., Woodside — LIBRARY — Oct. 6, by Buildings & Grounds Com., Bd. Trustees Queens Boro Pub. Library, 8914 Parsons Blvd., Jamaica, 2 story, basement, brick, stone, 55th St. and Skillman Ave.

Ore., Medford—COURT HOUSE—Jackson Co. bids about Oct. 15, 4 story, basement, brick, rein.-con. $200,000. J. G. Link, Medford, archt. Noted June 18.

CONTRACTS AWARDED

Mass., Springfield — MUSEUM — Springfield Library Assn., N. D. Bill, pres., for Gray Museum, 2 story, basement, 100 x 125 ft., brick, steel, granite, limestone, marble, to E. J. Pinney, Inc., 220 Dwight St. Est. $350,000. Noted Sept. 3.

Mass., Springfield — NATURAL HISTORY MUSEUM—Springfield Library Assn., N. D. Bill, pres., 2 story, basement, irregular sized, brick, steel, limestone, to E. J. Pinney, Inc., 220 Dwight St. Est. $150,000. Noted Sept. 3.

N. J., Bernardsville—LIBRARY—Bd. Trustees, general contract 1 story, basement, brick, steel, to J. Dobbs, Inc., 56 Mount Airy Rd., Bernardsville. Est. $150,000. Noted Sept. 24.

N. J., Maplewood—MUNICIPAL—Tow. Shp. Comm., F. G. Armitage, clk., Municipal Bldg., general contract 1 and 2 story, 200 x 180 ft., brick, steel, to Doe Wathey Co., 178 Arlington Ave., Newark, $153,000; plumbing, to J. F. Joyce, 84 South 6th St., Newark, $8,220; heating and ventilating, to J. H. Cooney, Inc., 210 North 4th St., Harrison, $17,291; electrical work, to A. N. Meister Co., 401 South 15th St., Newark, $14,495; steel and iron to Schlack-Meyer Co., 601 22nd St., West New York, $12,045. Grand total $265,101. Noted Sept. 17.

R. I., East Providence (Inc. Providence)—MARKET—Providence Pub. Market, O. Swanson, 380 Westminster St., Providence, 2 story, basement, brick branch market, plain found., 18,000 ft. per floor space, to P. J. Flynn, Industrial Trust Bldg., Providence. Est. $150,000. Noted Sept. 10.

S. D., Pierre—CAPITOL—State, Capitol Building Comm., general contract 4 story, basement, 68 x 138 ft., rein.-con., Bedford stone, sandstone addition, to Henry Carlson Co. 407 Minnehaha Blk., Sioux Falls, $224,240. Noted Sept. 3.

UNCLASSIFIED

PROPOSED WORK

Mass., Truro—MUSEUM—Truro Neighborhood Assn. museum, Main St. $150,000. Funds being raised for same.

N. J., Clifton—HOME—Clifton Lodge 8, P. O. E., F. A. Latimer, exalted ruler, 725 Clifton Ave., 2 story, basement, brick, steel addition, $150,000. Lee & Dewitt, 152 Market St., Paterson, archts. Bids in. Project in abeyance.

N. J. Lakewood—MOTION PICTURE STUDIO, etc.—Lakewood Studio Co. and Meryanble Land Co., c/o D. J. Scrocco, archt., 60 Park Pl., Newark, revised sketches 2 story, basement, 10 story tower motion picture studio and radio broadcasting station, Pine Forest Manor. $1,000,000. **Maturity probably in spring.** Noted Feb. 5.

N. J., Montclair—RAILROAD STATION—Erie R.R. Co., G. S. Fanning, ch. engr., 101 Prospect Ave., Cleveland, O., 2 story, basement, brick, steel. $150,000. **Maturity probably soon.** Private plans.

N. Y., New York — DORMITORY — Sisters of Jean Baptiste, 184 East 76th St., dormitory, 1887 Lexington Ave. $250,000. Bids in. Will award contract after Oct. 15. R. J. Reilly, 12 East 41st St., archt. Noted Aug. 27.

Pa., Loretto—MAUSOLEUM—C. M. Schwab plans by H. Hornbostel, Hardy & Hayes Bldg., Pittsburgh, mausoleum. $300,000.

Pa., McKeesport—MARKET—J. V. Balsamo plans by C. L. Whittaker, Bravesburg, 2 story, basement, brick, steel, incl. $40,000 cold storage cooling system, 5th and Sinclair Sts. $150,000.

Vt., Bellows Falls—EXCHANGE—New England Telephone Co., C. H. Hopkins, mgr., Montpelier, bids in December 2 story, basement 80 x 120 ft., brick, plain found., Henry St. $200,000. Private plans.

Wis., Appleton — MAUSOLEUM — Riverside Memorial Co., I.O.O.F. Bldg., mausoleum, monolithic concrete, granite exterior, marble interior. $160,000. Architect not appointed.

BIDS ASKED

N. J., Morristown—PROFESSIONAL, etc.—W. E. Lehman, archt., 972 Bond St., Newark, new bids about Oct. 15 on revised plans, general contract 2 story, basement, 70 x 175 ft., brick, steel, stone, professional, store building, South and Pine Sts., for Stamelman Realty Co., c/o architect. $150,000. Noted Sept. 3.

N. Y., Brooklyn—MUSEUM—Brooklyn Institute of Arts & Sciences, 45 Plaza St., bids about Dec. 1, general contract altering museum, Eastern Parkway and Washington Ave. $265,000. McKim, Mead & White, 101 Park Ave., New York, archts. Noted Aug. 13.

CONTRACTS AWARDED

Mass., Boston—MUSEUM—Gardner Museum, 280 Fenway St., 2 story, basement, rein.-con., brick addition, plain found., Fenway Court and Worthington St., to Chase & Gilbert, Park Sq. Bldg. Est. $150,000.

Industrial Buildings

FACTORIES AND MILLS

PROPOSED WORK

Calif., Exeter — ICE MANUFACTURING PLANT—Tulare Ice Co., M. and Pine Sts., Tulare, sketches ice manufacturing plant, $15,000.

Calif., Los Angeles—PACKING PLANT—Herman Packing Co., 3401 East Vernon St., 32 x 52 ft., rein.-con., brick, steel sash, steel metal work addition.

Calif., Los Angeles—FACTORY—Los Angeles Soap Co., 617 East 1st St., plans by Morgan, Wells & Clements, 1135 Van Nuys Bldg. (1st unit), 2 story, basement, 140 x 268 ft., concrete, rein.-con., brick filler walls, incl. sprinkling system, tanks, spur tracks, 617 East 1st St. $200,000.

Calif., Los Angeles — FACTORY—Pioneer Paper Co., 5500 South Alameda St., purchased 1 acre site for future plant additions.

Mass., Barnstable — PLANT — Dutchland Farms, Inc., H. Cox, mgr., altering and constructing plant addition, Scudder Ave. and Centreville Rd., Hyannis Sect. $40,000. Private plans.

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Factories and Mills (Continued)

Mass., East Boston (sta. Boston)—BAKERY, etc.—P. Odierno, 112 Porter St., plans by M. J. Mastrangelo, 40 Court St., Boston, altering and constructing 3 story, basement, brick bakery and apartment addition, plain found. $40,000.

N. J., Elizabeth—PLANT—Schonwalter Tallow Co., Woodruff Lane, soon takes bids reconstructing tallow plant, $40,000 or more, incl. equipment. **Maturity soon.** Noted Sept. 10.

N. Y., New York—LAUNDRY, etc.—Consolidated Laundries, 122 East 42nd St., will not build 2 story, 50 x 153 ft. laundry and garage, Wilkins Ave. and 170th St. $60,000. Project abandoned. Noted Sept. 17.

N. Y., New York—LAUNDRIES—Sweets Laundry Shops, 405 Lexington Ave., chain of laundries. $40,000. Project in abeyance. Noted Aug. 20.

N. Y., Richmond Hill—ICE CREAM PLANT, etc.—Anheuser Busch, 979 Brook Ave., New York, altering 2 story, 164 x 210 ft. ice cream plant, garage, 104th St., Atlantic and 94th Aves. $40,000. J. E. Ross, 23 West 43rd St., New York, archt.

N. Y., Ridgewood—FACTORY, etc.—Muller Paper Goods Co., Prospect Ave. and Linden St., altering and constructing 1 and 3 story, 99 x 100 ft. factory, office addition. $75,000. H. Brucker, 2424 Myrtle Ave., archt.

Pa., Beaver Falls—FACTORY and OFFICE—Mayor China Co., plans by Carlisle & Sharrer, Martin Bldg., N. S. Pittsburgh, rebuilding after fire.

Pa., Rouseville — PLANT — J. Baltrosky, Seneca St., Oil City, sketches rebuilding plant. $40,000.

Utah, Woodside—DRY ICE PLANT—Carbon Dioxide & Chemical Co., c/o W. C. Cavenaugh, mgr., sketches addition. $100,000.

Wash., Tacoma—LUMBER PLANT—Cavanaugh Lumber Co., C. Cavanaugh, pres., rebuilding lumber plant, recently destroyed by fire. $65,000 loss.

Wis., Ashland—PLANT—Pittsburgh & Ashland Coal & Dock Co., F. M. Hogan, mgr., plans by R. C. Buck, Inc., 919 Tower Ave., Superior, brick, steel, rein.-con. plant. $100,000.

Wis., Manitowoc—FACTORY—White House Milk Co., H. M. Clark, mgr., South 21st St., brick, steel, rein.-con. $200,000. Architect not appointed.

Wis., Tomahawk — NEWSPAPER PLANT—Tomahawk Leader 1 story, basement, 60 x 90 ft., brick, steel, rein.-con. plant. $40,000.

Wis., Wisconsin Rapids—PLANT—City, C. P. Grass, clk., rein.con., brick electric lighting switchboard building equipment. $40,000. Architect not appointed.

Que., Three Rivers—GAS PLANT—City Gas & Electric Corp., Quebec City, gas plant. $500,000.

BIDS ASKED

Mich., Ypsilanti—AUTO FACTORY—Albert Kahn, archt., 1000 Marquette Bldg., Detroit, bids about Oct. 10, 1 story, 160 x 350 ft., brick, steel, concrete, plain found., for Ford Motor Co., Constr. Dept., Dearborn. $100,000.

N. J., Bogota—INDUSTRIAL—F. L. Smith, engr. and archt., 21 East 40th St., New York, taking bids on separate contracts revised plans 1 and 2 story, basement, brick, steel, rein.-con., West Fort Lee Rd., for G. M. Brewster & Son, 253 West Fort Lee Rd. $40,000. Noted Sept. 3

N. J., Fairview—FACTORY—See "Contracts Awarded."

N. J., Hoboken—FACTORY—Garsten Realties Co., J. Bonanno, pres., 1827 Bergen Turnpike, bids about Mar. 1, general contract 1 story, basement, brick, steel, Madison and Jefferson Sts. between 14th and 15th Sts. $40,000. Private plans. Noted Sept. 24.

N. J., Garfield—LAUNDRY—F. Siortino & V. Lamendola, Main St., bids about Oct. 15, general contract brick, steel, Division Ave. $40,000. Noted Aug. 12.

N. Y., Brooklyn—FACTORY—See "Contracts Awarded."

Tex., Harlingen—DRY FEED MILL—B. A. Peek, 914 East Fillmore St., J. F. Plangman, Dallas, taking bids 2 story, 30 x 60 ft., brick, rein.-con., plain found., incl. necessary equipment. Private plans.

CONTRACTS AWARDED

Ala., Mobile — PETROLEUM REFINING PLANT—Coastal Petroleum Corp., refinery, Blakely Island, to J. T. Devine Mfg. Co., Mt. Vernon, Ill., and 25 West 43rd St., New York. Noted Aug. 27.

Conn., Willimantic—TEXTILE MILL—Corn Spinning Co., Bridge St., 2 story, 60 x 100 ft., brick extension, to O. L. Willard, 70 Valley St. Est. $40,000.

Ind., Vincennes—FACTORY—Central Fibre Co., general contract brick, steel factory and power plant addition, to Voight & Son, Louisville, Ky. Est. $40,000.

Mo., St. Louis—NEWSPAPER PUBLISHING PLANT—Midwest Industrial Development Co., c/o Illinois Terminal R.R. Co., A. P. Titus, vice-pres., 314 Shell Bldg., substructure 5 story, basement, 120 x 168 ft., rein.-con., brick, stone, High, 12th and Morgan Sts., to Ben Hur Erection Co., 5100 Farlin St. Total est. $1,500,000. Star Chronicle Publishing Co., E. Roberts, 12th and Olive Sts., lessee. Noted July 23.

N. J., Allenwood—PLANT—Ballinger & Co., engrs. and archts., 12th and Chestnut Sts., Phila., Pa., general contract altering 2 story, basement, brick, steel, to M. E. Tredenick, 25 West 45th St., New York, for Amer. Colortype Co., 207 West 25th St., New York, plumbing, to Burns, Lane & Richardson Co., 301 Burnett St., New Brunswick. Est. $40,000. Noted Aug. 10.

N. J., Burlington—BULK PLANT—Standard Oil Co. of New Jersey, general contract 2 story, basement, 60x95 ft., two 1 story, basement, 40 x 40 ft. and 1 story, basement, 20 x 30 ft. plants, to Karno Smith Constr. Co., Broad St. Bank Bldg., Trenton. Est. $150,000. Noted Sept. 3.

N. J., Fairview—EMBROIDERY FACTORY—F. Ebert, 510 Madison St., 1 story, basement, brick, steel, rein.-con., 482 Cliff St., separate contracts. $40,000. Lucht & Anderson, 432 Palisade Ave., Cliffside, archts.

N. Y., Brooklyn—FACTORY, etc.—Reid Ice Cream Co., altering 4 story factory, tank to Equity Constr. Co., 25 West 43rd St., New York. Est. $105,000. Noted Sept. 24.

N. Y., Brooklyn—FACTORY—M. Tatarsky, 1935 Bedford Ave., 4 story, 94 x 126 ft. factory, McKibben and White Sts., separate contracts. $150,000. M. Klein, 65 Court St., archt.

N. Y., New York—PRINTING and PUBLISHING—Lockwood, Greene & Co., archts. and engrs., 100 East 42nd St., printing and publishing plant, to A. L. Hartridge Co., 570 Lexington Ave., for Dow Jones Publishing Co., 44 Broad St. $400,000. Noted Sept. 17.

GARAGES

PROPOSED WORK

Ind., Muncie—Lincoln Oil Co., 2 story, basement, 60 x 90 ft., rein.-con., brick, steel super service station, incl. steam heating, machine shop, High and Seymour Sts. $43,000. Private plans.

Mass., Brookline—Town, D. A. Rollins, chn. Bd. Selectmen, garage, rear of police station. $40,000 or more. Architect not appointed.

Mass., Medford—Boston Elevated Ry. Co., 31 St. James Ave., Boston, are taking bids superstructure 1 story, 65 x 155 ft. brick, steel bus garage, Felsway W. and Salem St. Total est., $50,000. A. J. Blackburn, 31 St. James Ave., Boston, archt.

N. Y., Long Island City—J. C. Trumpfeller & Sons, 47th Ave. and Queens Blvd., plans by C. Hendry, 8304 Baxter Ave., Jackson Heights, 2 story garage, factory, 47th Ave. and Queens Blvd. $40,000.

N. Y., New York—Corporation, c/o J. Irving, 332 East 149th St., soon takes bids general and separate contracts service garage, Westchester and Wilkinson Aves. $40,000. C. Schaefer, Jr., 332 East 149th St., archt. Noted Sept. 17.

N. Y., Ozone Park—S. Lopiccolo, 301 Court St., Brooklyn, sketches by C. Cannella, 1163 Herkimer St., Brooklyn, 100 x 164 ft. service garage, Atlantic Ave. and 102nd St. $40,000.

R. I., Providence—J. J. Flannegan, 134 Sharon St., plans by W. G. Richars, 49 Westminster St., 1 story, brick, steel, rein.-con. garage, 149 Park St. $40,000 to $50,000.

CONTRACTS AWARDED

Conn., Hartford—Southern New England Telephone Co., 185 Pearl St., 1 story, 35 x 50 ft. and 50 x 60 ft., brick, steel fire service and battery station, to Industrial Constr. Co., 721 Main St. Est. $40,000.

Conn., Meriden—Connecticut Light & Power Co., 155 High St., Hartford, brick, steel, concrete service and garage unit, Cooper St., to United Engineers & Constructors, 112 North Broad St., Phila., Pa. Est. $140,000.

Ind., Gary—Standard Oil Co., general contract rein.-con., brick, steel, tile super service station, 4th Ave. and Industrial Hy., to Williams & Patch, 757 Bway. Est. $40,000.

N. Y., New York—J. M. Horton Ice Cream Co., 205 East 24th St., garage and repair shop, to Equity Constr. Co., 25 West 43rd St. Est. $95,000. Noted Sept. 17.

SHOPS AND FOUNDRIES

PROPOSED WORK

Mass., Chelsea—AUTO SHOP, etc.—Ribock, Borr & Glick, 89 Park St., sketches by Krokyn, Brown & Rosenstein, 120 Milk St., Boston, 1 story auto shop and showroom, Park and Cross Sts. $40,000.

BIDS ASKED

Mass., Dorchester — SHOP — Massachusetts Auto Serv., 1228 Massachusetts Ave., taking bids 1 story, 60 x 160 ft. concrete steel auto repair shop, concrete found., 1236 Mass. Ave. $40,000. R. E. Bossi, 117 East Cottage St., archts. Noted Sept. 24.

POWER PLANTS

PROPOSED WORK

Ind., Crown Point—City Council postponed taking bids light plant improvements, incl. two 100 kw. Diesel motors and two 250 g.p.m. deep well pumps. $33,000. Noted Aug. 27.

Ind., Newcastle—Village of Epileptics, State of Indiana, plans by Foltz, Osler & Thompson, 1037 Architects & Builders Bldg., Indianapolis, 1 story, basement, rein.-con., brick, sheet metal stone heating plant. $50,000. Bevington & Williams, Inc., 1139 K. of P. Bldg., Indianapolis, engrs.

Ky., Mt. Sterling—Soon takes bids Diesel engine for municipal power plant. Burns & McDonnell Eng. Co., 400 Interstate Bldg., Kansas City, Mo., engrs. Noted Mar. 19.

Mass., Medfield—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, soon takes bids new boilers at State Hospital. $40,000 appropriated. W. & J. Engr. Co., 694 Washington St., Boston, engrs.

Mass., Taunton—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, soon takes bids boiler room improvements, incl. two 350 hp. water tube boilers and brick stack in hospital. $40,000. T. Main, Inc., 201 Devonshire St., Boston, engrs. Noted Sept. 3.

Mass., Wrentham—Commonwealth of Massachusetts, Dpt. Mental Diseases, State House, Boston, altering heating plant, at State School. $45,000. Engineer not selected.

O., Cleveland—City, D. R. Morgan, mgr., extensions, additions to electric light plant, incl. 15,000 kw. unit to replace 5,000 kw., add one 22,000 kw. unit or add one 20,000 kw. unit and 3 boilers or add one 25,000 kw. turbo generator, East 53rd St. $2,500,000 bond election Nov. 3, for same. L. A. Quayle, City Hall engr.

BIDS ASKED

Ia., Iowa City—Oct. 7, by W. H. Gemmill, secy. State Bd. Educ., Des Moines, additional boiler unit in heating and power plant building at State University.

Mich., Wyandotte—Oct. 7, by Municipal Serv. Comn., power plant, Froelich & Emery, 2nd Natl. Bank Bldg., Toledo, O., engrs. Noted Aug. 20.

CONTRACTS AWARDED

Ia., Lake Mills—City Clerk, 1 story, 38 x 52 ft. concrete, tile power plant, incl. 2 Diesel engines, generating units, complete distribution system, to Fairbanks-Morse Co., 9th and Henry Sts., Omaha, Neb., $83,135. This corrects report in Sept. 17 issue.

N. Y., Brooklyn—Kings County Lighting Co., 6740 4th Ave., altering and constructing 2 story addition, to E. L. Phillips, 116 East 53rd St., and 50 Church St., New York. Est. exceeds $40,000. Noted Sept. 17.

Pa., Ford—City Council, A. B. Mahoney, clk., power plant improvements, furnishing, installing 500 kw. Diesel oil engine, to Nordberg Mfg. Co., East Oklahoma and Chase Aves., Milwaukee, Wis., $32,978; furnishing, installing cooling tower and closed type cooling system from 1,500 brake hp. and Diesel oil and overload storage tank and auxiliaries, to J. F. Pritchard Co., 528 Dwight Bldg., Kansas City, Mo., $8,213; furnishing, installing switchboard and switching equipment with wiring, conduit and auxiliaries, to Westinghouse Electric & Mfg. Co., East Pittsburgh, $12,065. Grand total $53,256.

R. I., Howard—State, P. Welfare Comn., furnishing, installing 500 hp. cross drum water tube boiler at Central Power Plant, to Wickes Boiler Co., Saginaw, Mich.; brick setting, to C. McCormick, Providence; multiple retort stoker, to Combustion Eng. Corp., 80 Federal St., Boston, Mass.; cinder trap with butterfly damper to Green Fuel Economizer Co., 201 Devonshire St., Boston, Mass.

WAREHOUSES

PROPOSED WORK

N. J., Irvington—Owner, c/o N. J. Convery, archt, 32 Walnut St., Newark, 2 story, basement, brick, steel warehouse, Lyons Ave. $150,000. Project in abeyance. Noted Sept. 10.

N. J., Newark—Wilkinson Gaddis & Co., 95 Parkhurst St., 5 story, basement, brick, steel grocery warehouse, office. $500,000. **Maturity probably in January.** Epple & Kahrs, 15 Washing St., archts. Noted Sept. 24.

Pa., Pittsburgh—Ballinger Co., archts. and engrs., 105 South 12th St., Phila., 3 story, 70 x 100 ft. warehouse, office, 1 story, 21 x 41 ft. garage, brick, steel, concrete pile found. for Norton Co. Project temporarily in abeyance. Noted Sept. 10.

CONTRACTS AWARDED

N. J., East Burlington—Standard Oil Co. of New Jersey, 26 Bway., New York, bulk storage and warehouse, to Karno-Smith Co., Hillsdale and Broad Street Bank Bldg., Trenton. Est. $100,000. Noted Aug. 20.

N. Y., New York—Port of New York Authority, 80-90 8th Ave., 16 story, 2 basement union inland freight terminal, to Turner Constr. Co., Graybar Bldg., $7,591,000. Noted Sept. 17.

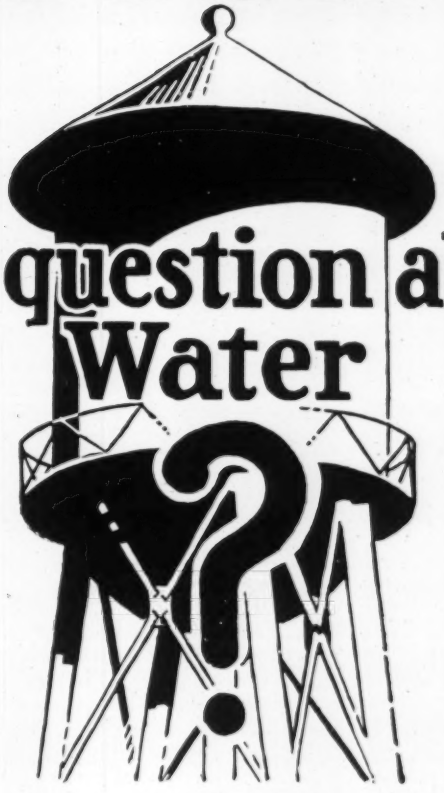
N. Y., North Hawthorne—Great Atlantic & Pacific Tea Co., brick, steel, concrete warehouse, to Austin Co., 16112 Euclid Ave., Cleveland, O. Est. $150,000.

Wash., Port Angeles—Olympic Forest Products Co., San Francisco, Calif., storage, to Austin Co., 16112 Euclid Ave., Cleveland, O., $25,000. Est. $40,000 with equipment.

Constr. News page 134

See proposal advertising on page 76

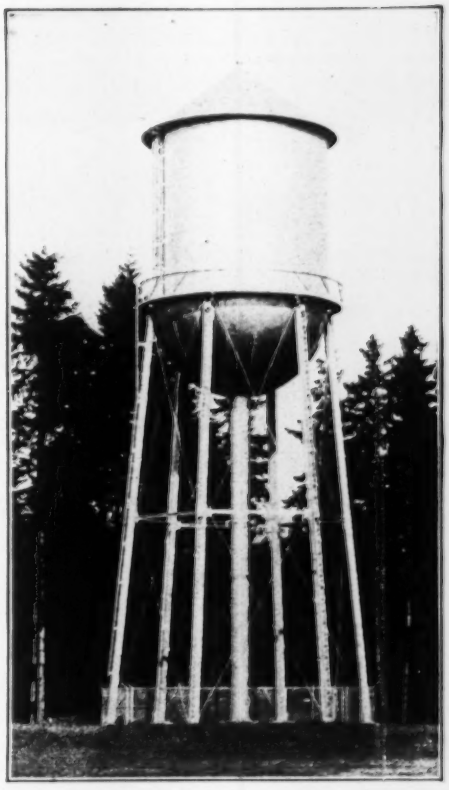
PITTSBURGH DES MOINES



Any question about Water

Two "Pittsburgh-Des Moines" tanks of 250,000 gallons capacity—500,000 gallons total—have just been completed this summer for the City of Olympia, Washington. The photograph shows the south tank—diameter 32 feet, 106 feet to upper water level and 74 feet 6 inches to the balcony.

The other tank, erected on the east side of the city, also has a diameter of 32 feet and stands on a slightly lower steel tower, 85 feet to the water level and 53 feet 10 inches to the balcony.



Other "Pittsburgh-Des Moines" Products

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New York Chicago San Francisco Atlanta Dallas Seattle

Work for All

SHALL next winter's unemployment emergency be relieved by work or by charity? This question, which we asked two weeks ago in urging public works for relief, is now the outstanding question of the day. The emergency has been brought into sensational prominence by the President's step in organizing nationwide charity relief measures. As yet nothing has been done toward mobilizing increased public works.

The President's extragovernmental organization is a reminder of wartime methods. And in a very real sense we are again at war—fighting to overcome the menacing effects of economic breakdown and win back for all the people the opportunity for self-support. If so, let wartime methods be applied purposefully, by overcoming idleness rather than by compromising with it. The outcome is sure if the fight is pressed intelligently and unitedly. At a time when our national resources have been developed to unparalleled richness it is unthinkable that we should yield to distress, or allow large numbers of the people to be demoralized by charity.

Public works can employ the idle and can make available to them, not by gift but by right of labor, the stores of food, clothing and shelter of which the country has abundance. Private business has proved powerless to maintain the workers at their jobs. The great resource of public work remains.

IS THIS resource sufficient? There are those who say that the great volume of public works required to meet the emergency does not exist, and that therefore we must resign ourselves to the charity plan. They disregard the facts.

Construction needs exist in prodigious volume. The country's annual budget of public-works construction approaches three and a half billion dollars. An addition of little more than twice this amount will give work to five million men at an expenditure of $1,500 per man for labor and materials. Less will do, in fact. Large numbers are engaged behind the lines: the supply, housing and service workers whose employment results from that of the direct producers; construction payrolls need not provide for these. It is quite likely that mere doubling of the volume of public-works construction for a year would provide a job for every seeker.

LET US make the picture specific. Road work alone could take care of the entire unemployment emergency, were no other source of work at hand. More than two million miles of road in the United States still want improvement from the dirt-road stage. Reasonable modernization of but half or a third of that mileage within a year would enlist the service of every unemployed worker. Tools might prove short at the start, but they could be provided.

But such intensive use of a single resource is not necessary. Many roads are remote, and the unemployed have gathered largely in the cities. They can find quite as much work close at home.

Cities can make available a vast total of urgent work —street widening and paving, modernization of public buildings, sewer and water improvement and the bettering of medieval conditions in dozens of directions. If nothing more were done than to safeguard, reconstruct and render decently habitable the notoriously unfit institutional buildings throughout the land, it would absorb a large contingent of the idle.

In brief, the volume of needed public works is ample to provide the employment by which the emergency can be met in full. Every state, county and city has its quota. There is federal construction also, but this is only a tenth of the country's annual public-works budget. The great bulk of emergency construction will come from the states and local communities.

WE ARE not forced to depend on charity, then. We can *work* our way out.

And the means are available. We lack neither money nor the ability to organize and plan quickly. The difficulties are great, but they can be overcome.

Financing is probably the greatest. Heavy tax burdens and local bond obligations throttle the public work of local communities. Cities are poor; tax collections are far behind and bonding margins are small or absent. But financing is easily accomplished through the superior ability of the federal government to market bonds. Loans of far greater proportions were sold to the people during the war. A reconstruction bond issue can quickly provide all the money needed, whether it taps the huge accumulation of idle investment funds through the banks or is distributed countrywide to the people.

Nor do the problems of organizing and planning surpass the nation's powers. No one who recalls what was done in 1917 and 1918 in carrying out in a few months a vast building and equipment program and putting the country to work for national purpose will have any doubt of our present powers. Engineers are more numerous and competent, constructors have doubled their achievements. Organizational and administrative skill is ready.

A NATIONAL emergency lies ahead, but a national spirit and united purpose can carry us through by work in place of charity. Time is vital, or winter will find us unprepared. But if the will to provide it be strong enough, work can be found for all.

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